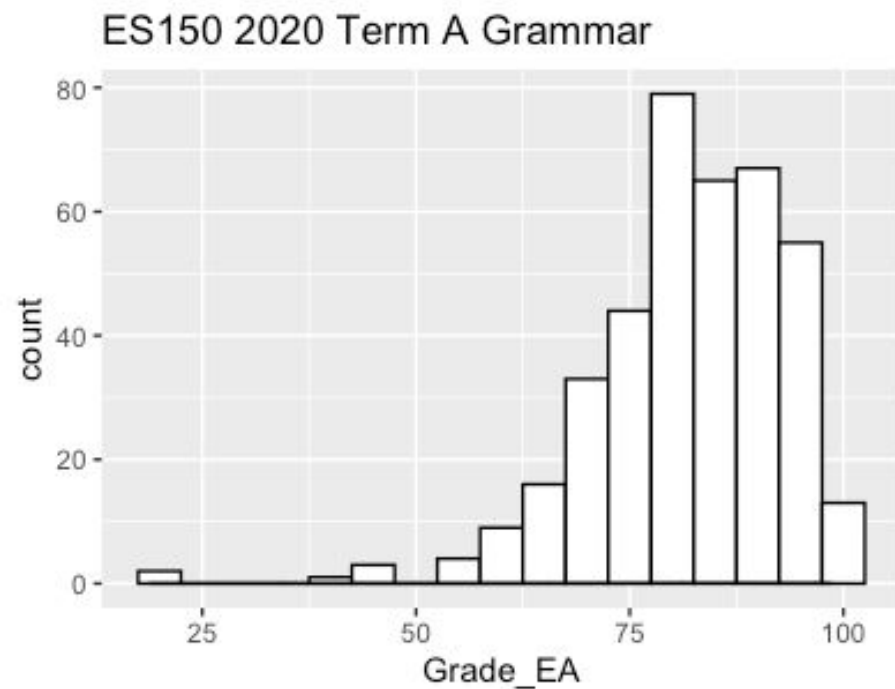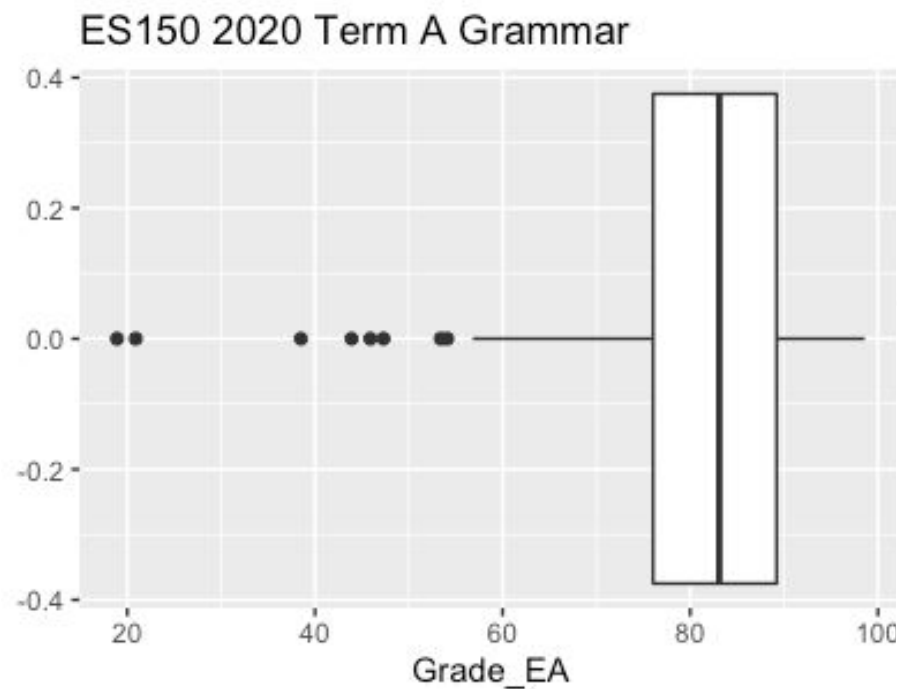# IRT Analysis

ES 150 2018-2020 Term A, B
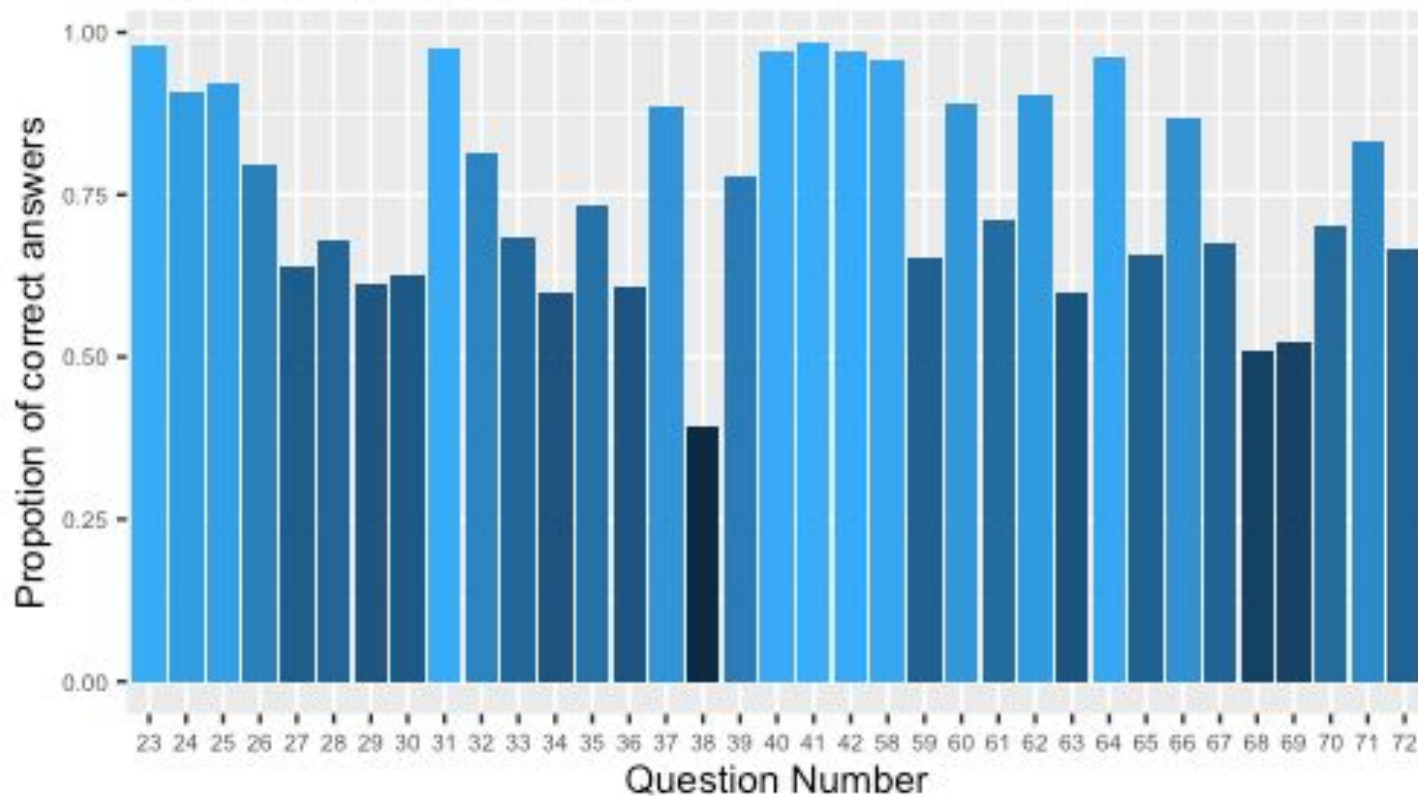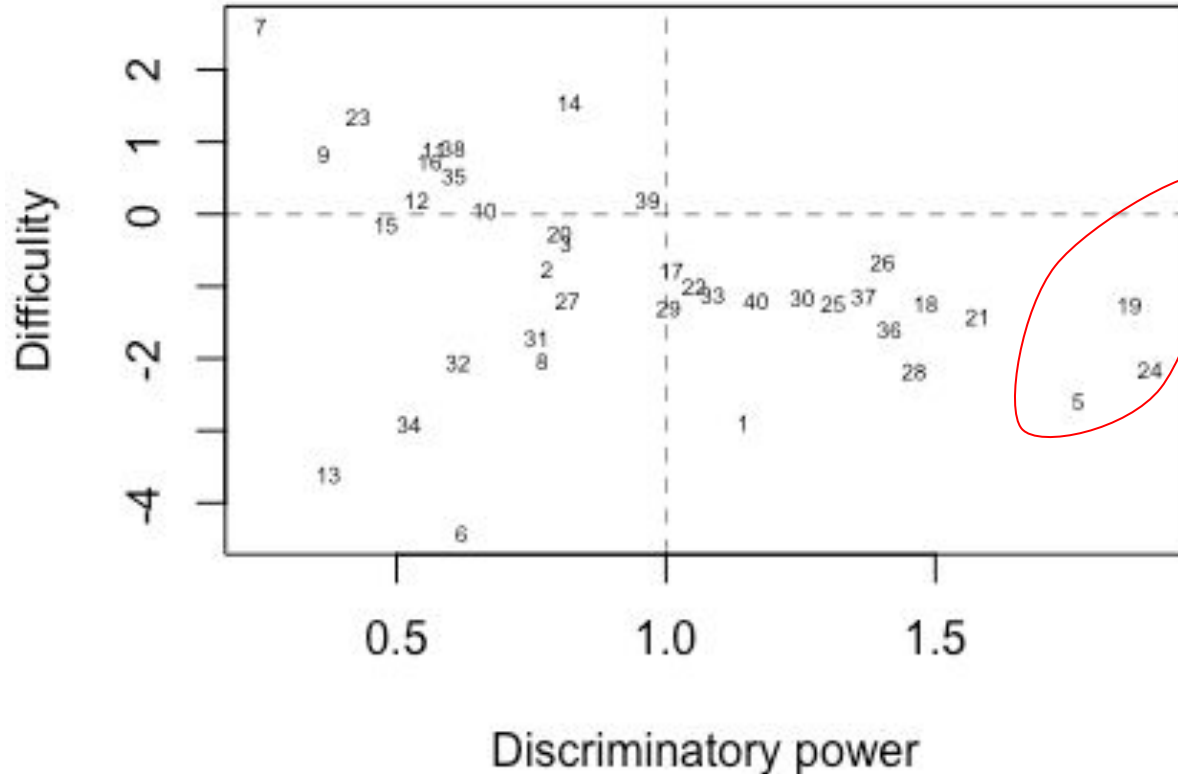
2020 Term A

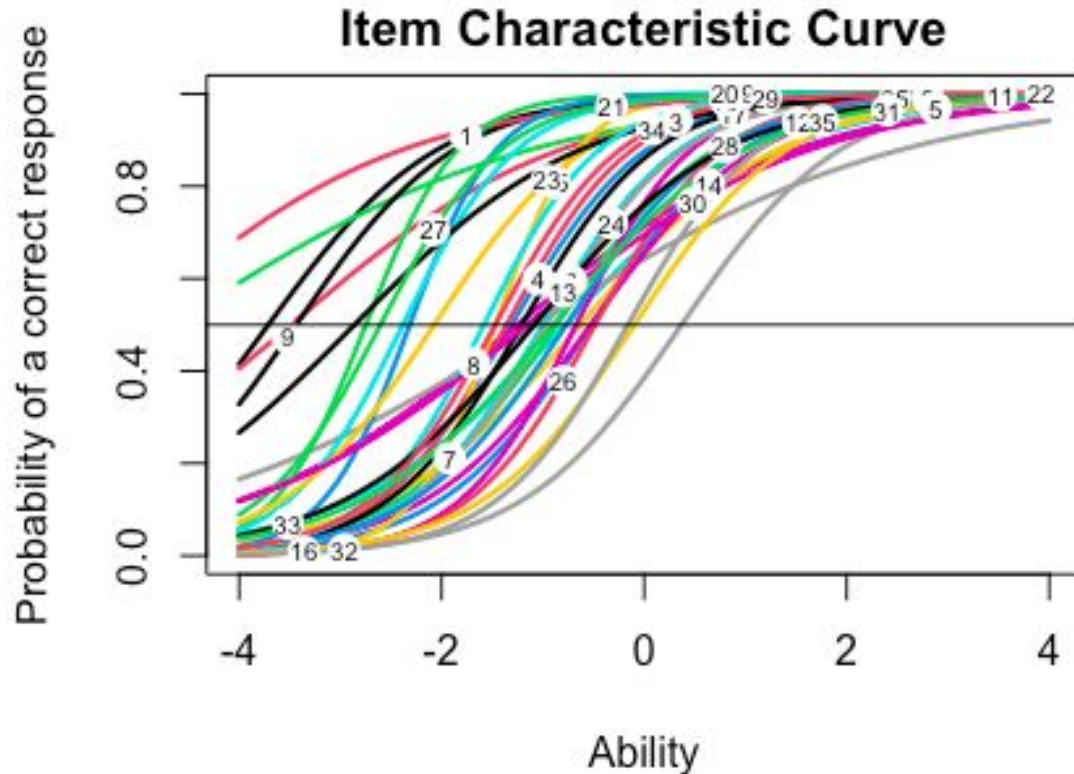# EDA

EDA

ES150 2020 Term A Grammar

Min: 0.3933
Median: 0.7352
Mean: 0.7620
Max: 0.9846
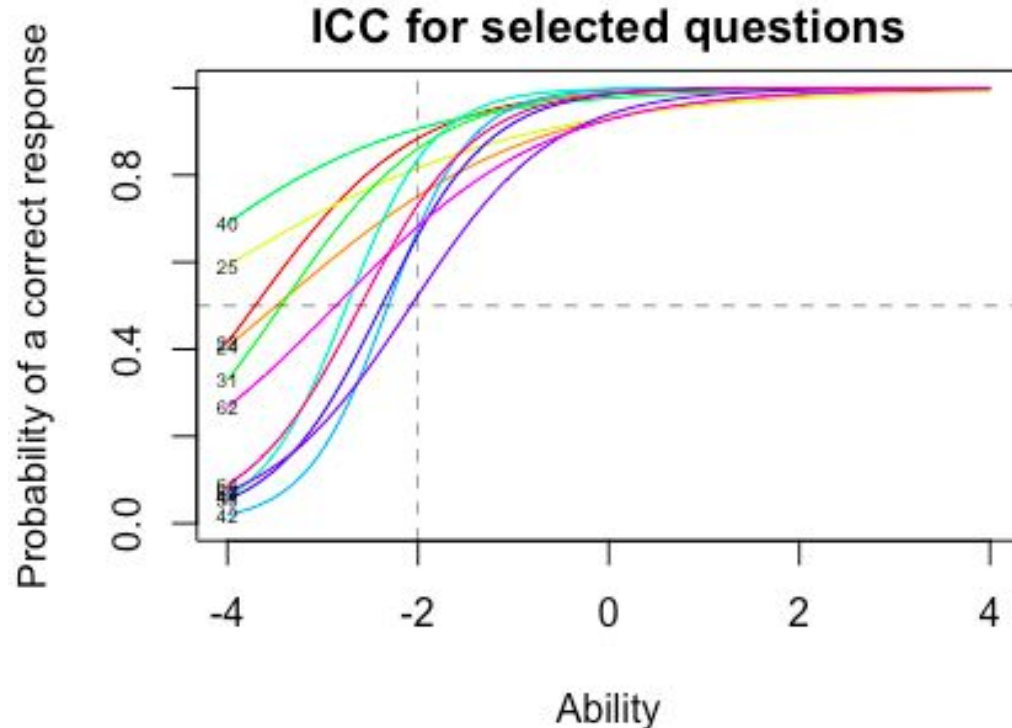
Discriminatory power - Difficulty plot

These problems have a strong discriminatory power with a moderate level of difficulty
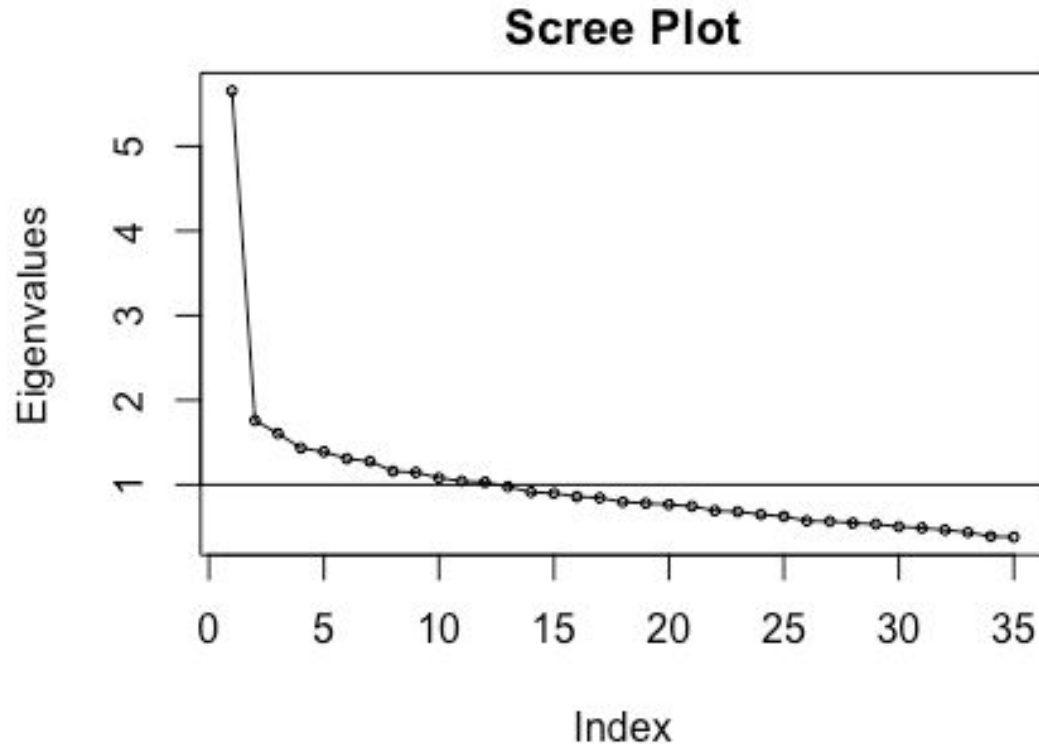
Item Characteristic Curve - Overview

Item Characteristic Curve - Selected Questions

ICC for selected questions

- Question 23, 24, 25, 31, 40, 41, 42, 58, 60, 62, 64

- Select the questions that more than half of the students with ability = -2 got correct

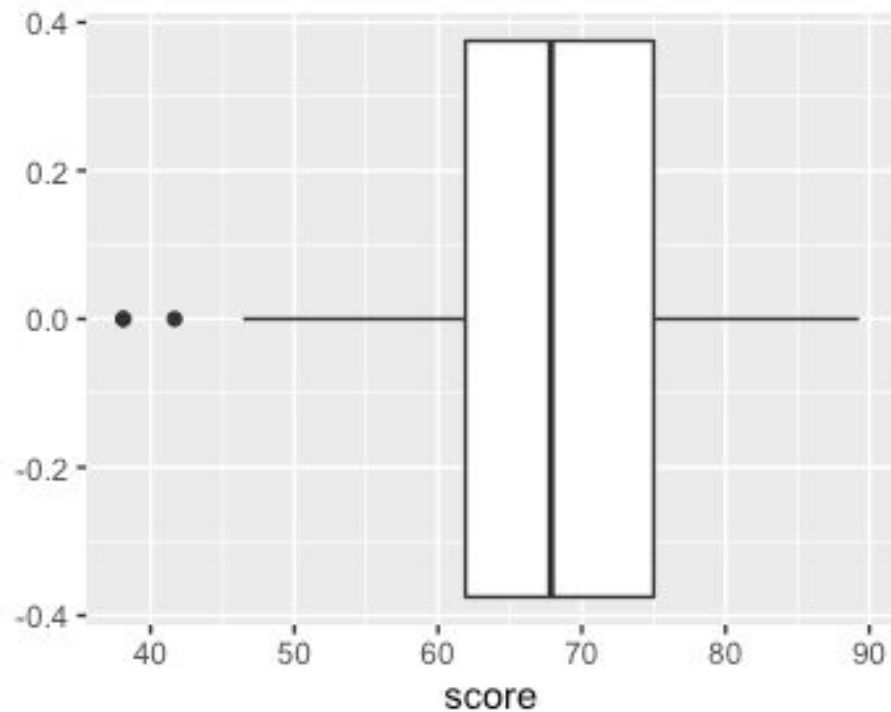- Students with poor ability can still get these questions correct

Scree Plot

Scree Plot

(x-axis: Index, y-axis: Eigenvalues)

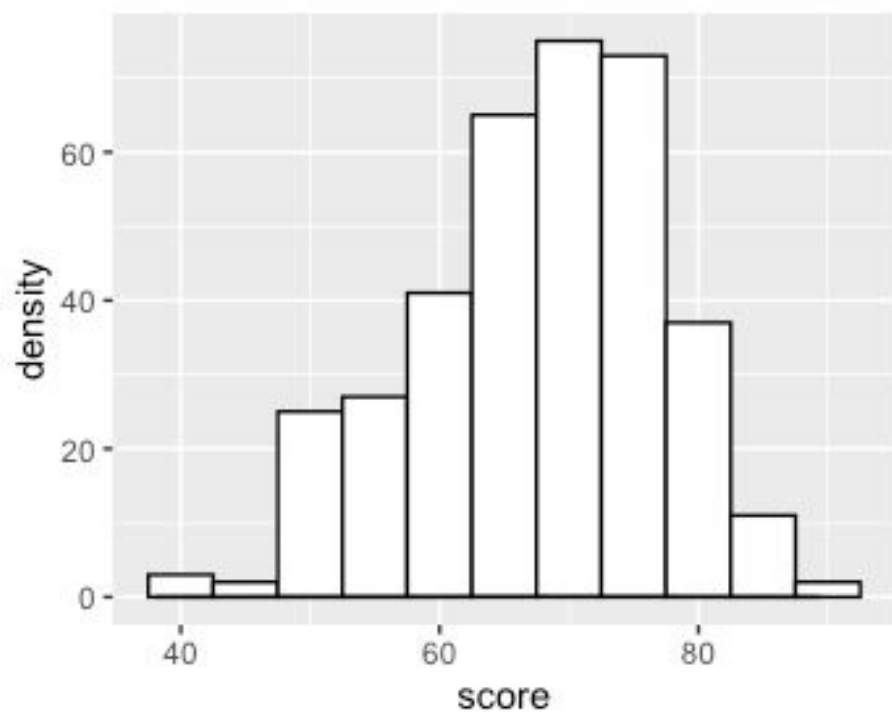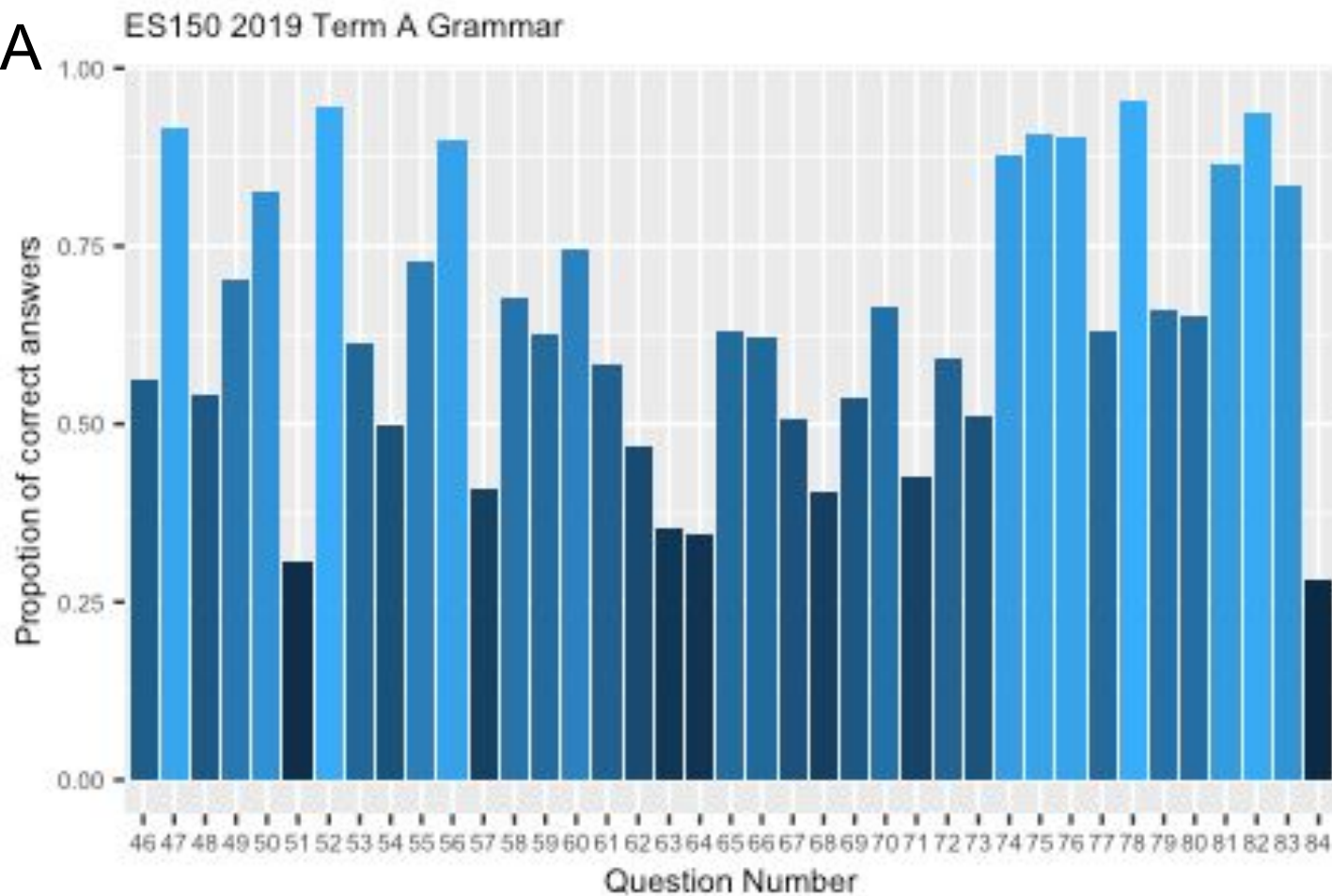- Since 12 of the items have eigenvalues>1, we only need 12 items to verify unidimensionality

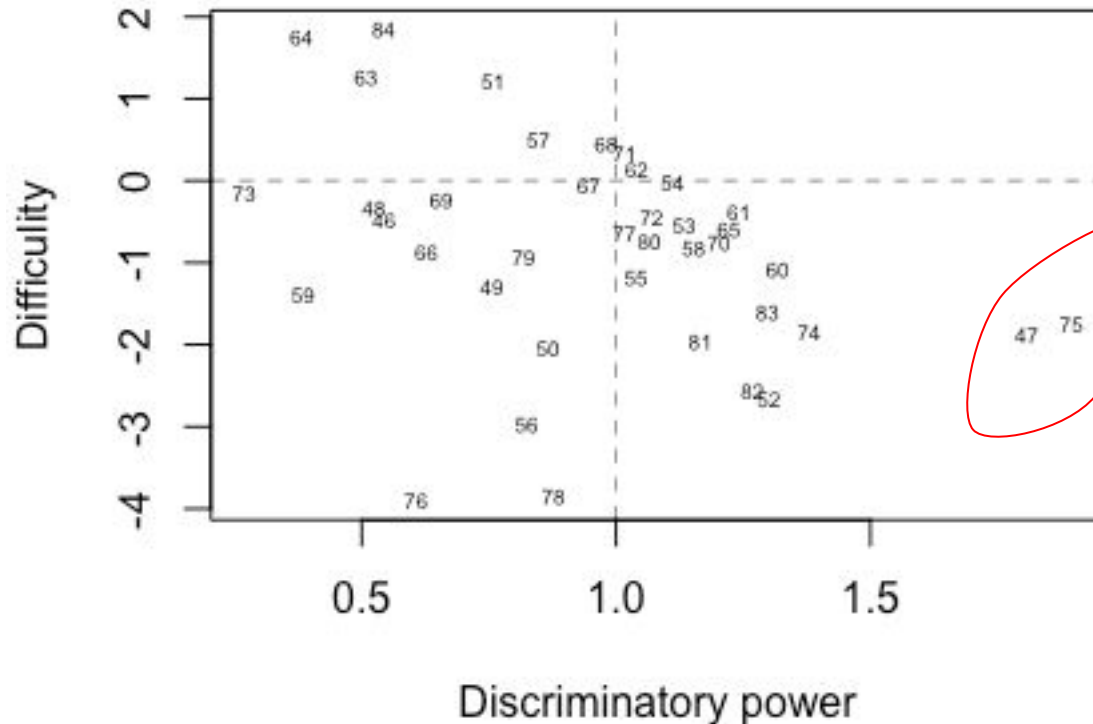# 2019 Term A

EDA

EDA

ES150 2019 Term A Grammar

Min: 0.2803
Median: 0.6295
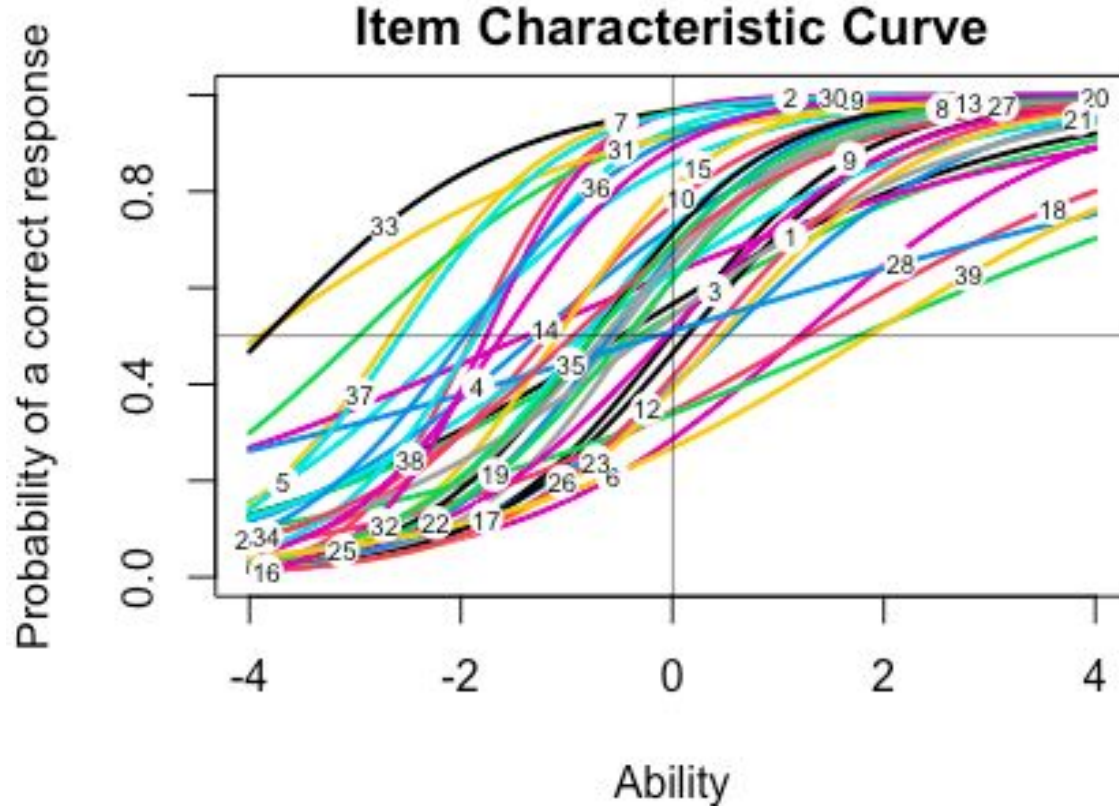Mean: 0.6445
Max: 0.9556

Discriminatory power - Difficulty plot

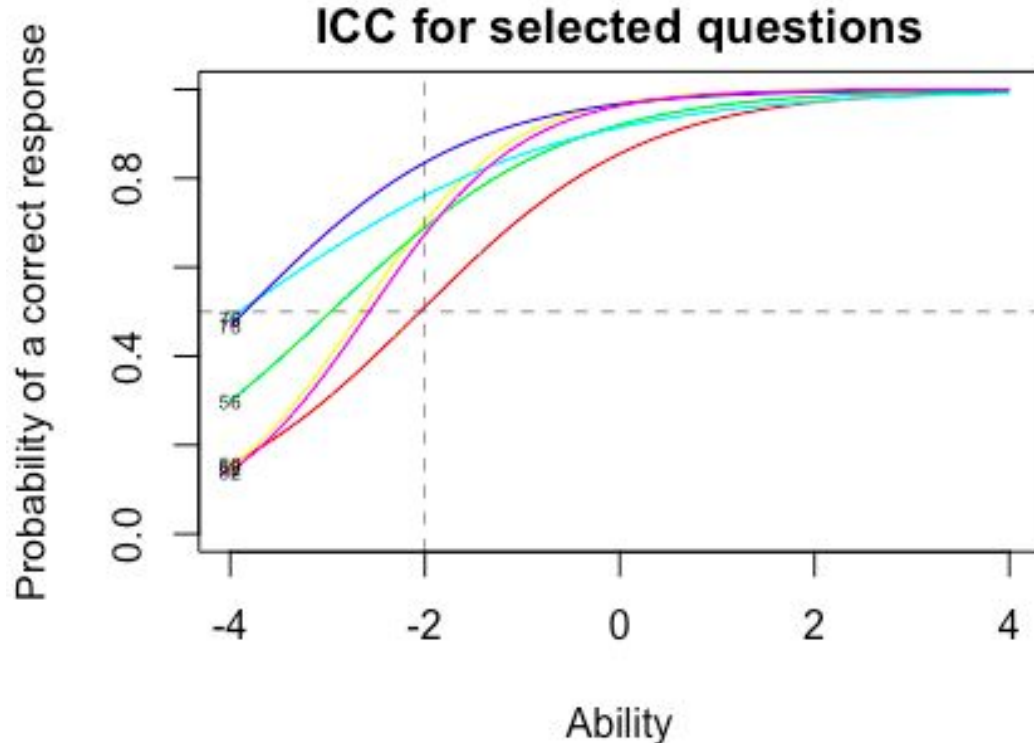- Most problems have discriminatory power in the range of 0.4-1.4

- Generally smaller discriminatory power

- Difficulty: majority < 0

These problems are the only ones with discriminatory power >1.5
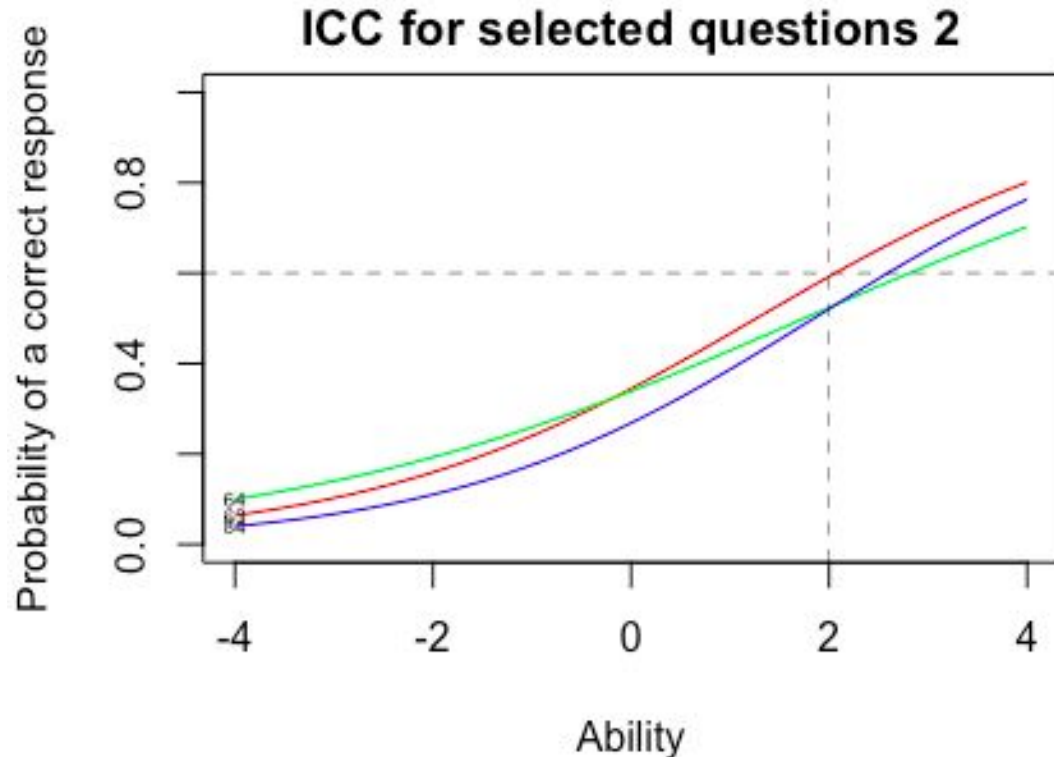
Item Characteristic Curve - Overview

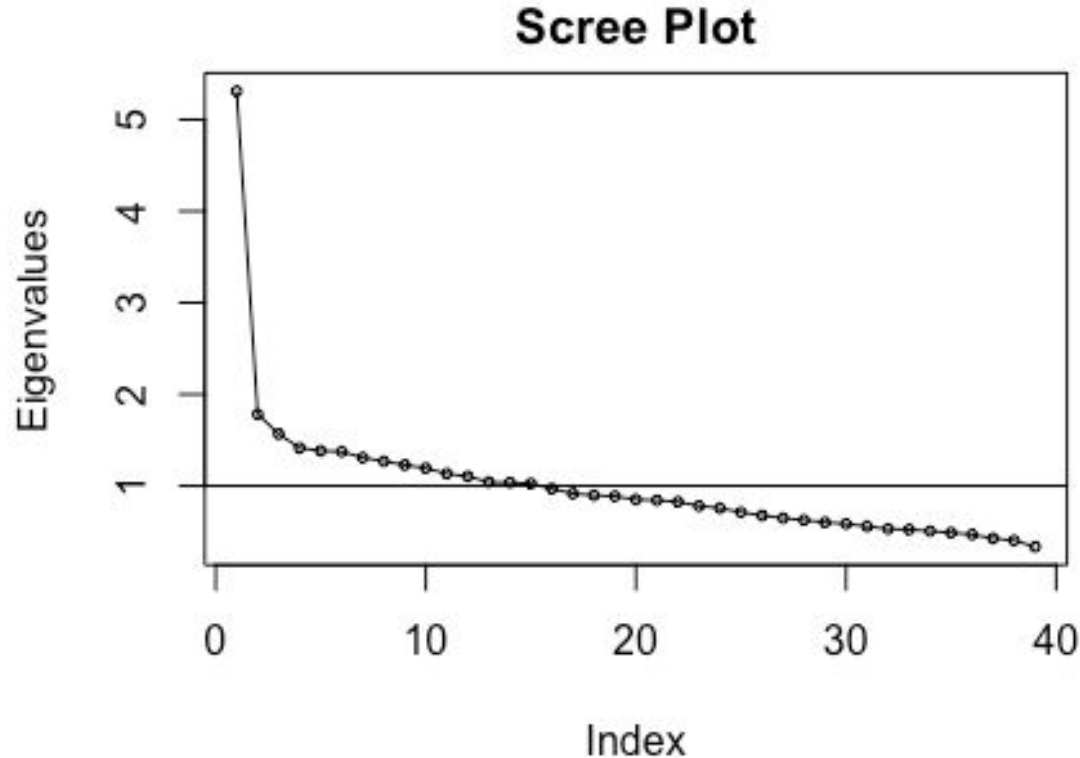# Item Characteristic Curve - Selected Questions

ICC for selected questions

- Question 50, 52, 56, 76, 78, 82

- Select the questions that more than half of the students with ability = -2 got correct

- Students with poor ability can still get these questions correct

Item Characteristic Curve - Selected Questions 2

ICC for selected questions 2

- Question 63, 64, 84

- Select the questions that more than 40% of the students with ability = 2 got wrong

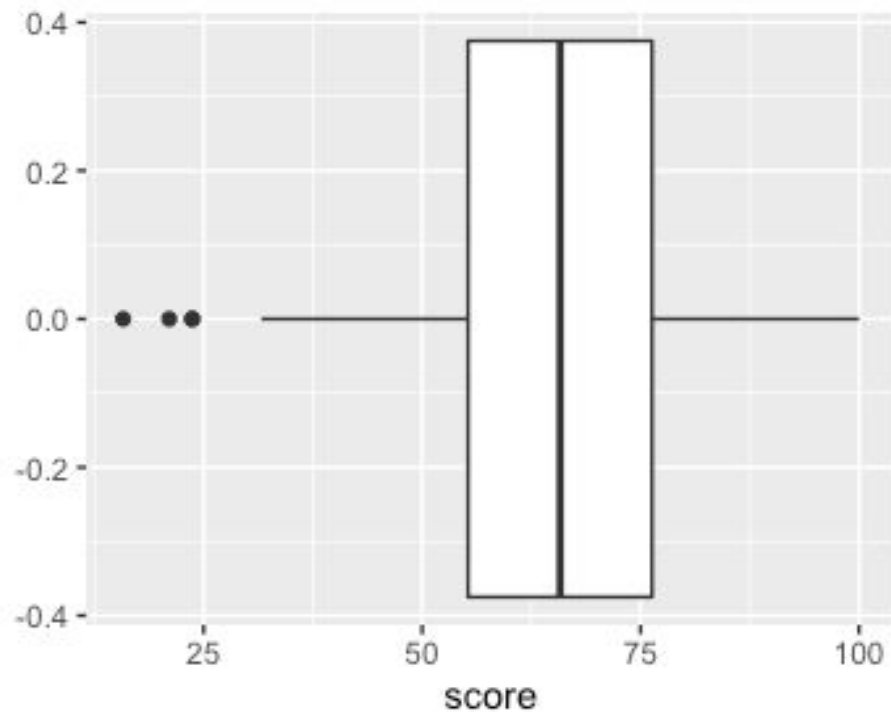- Students with high ability cannot get these questions correct

Scree Plot

Scree Plot

- Since 15 of the items have eigenvalues>1, we only need 15 items to verify unidimensionality
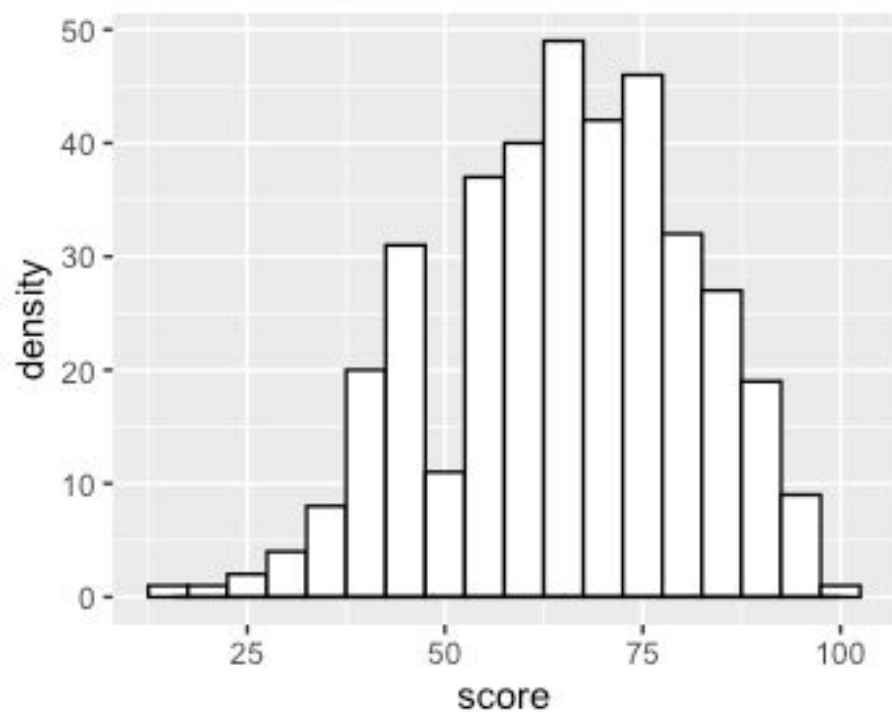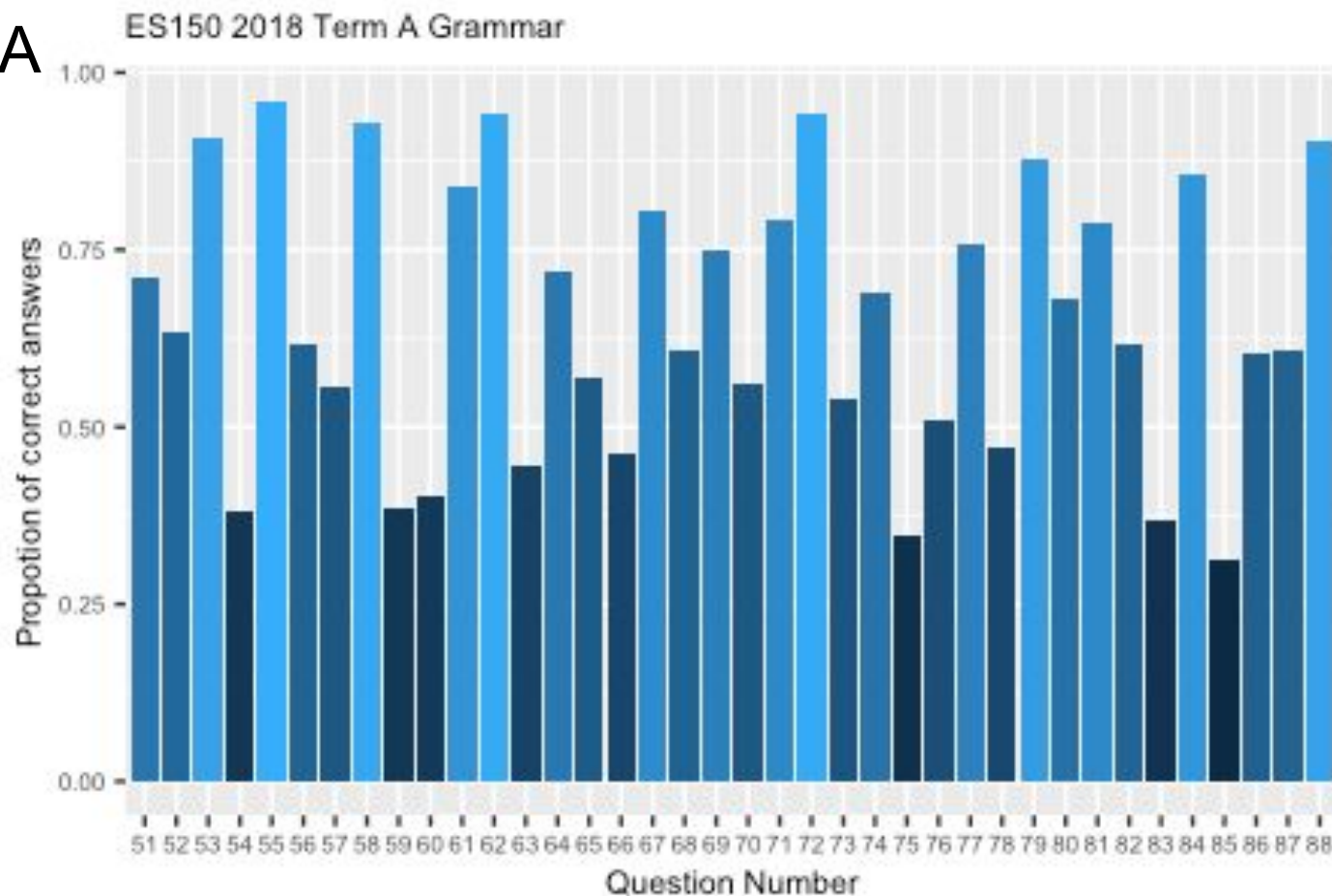
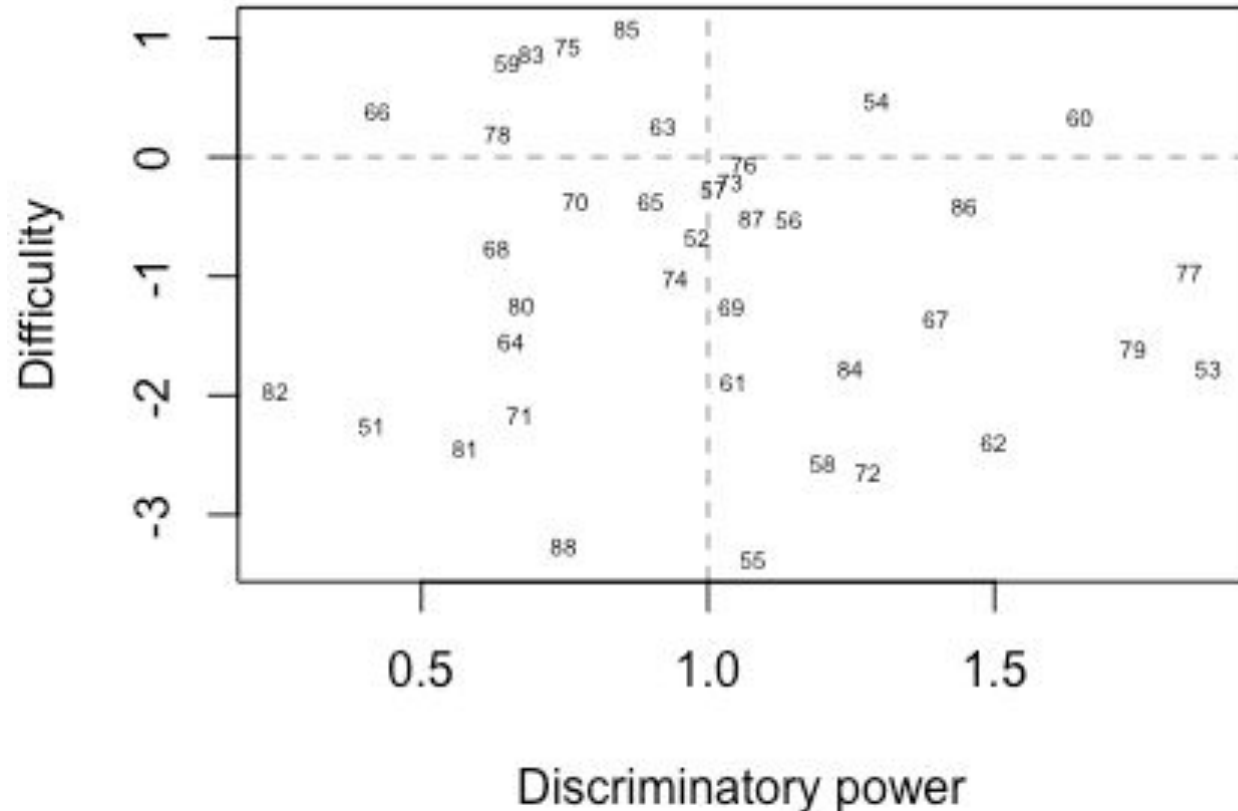# 2018 Term A

EDA

EDA
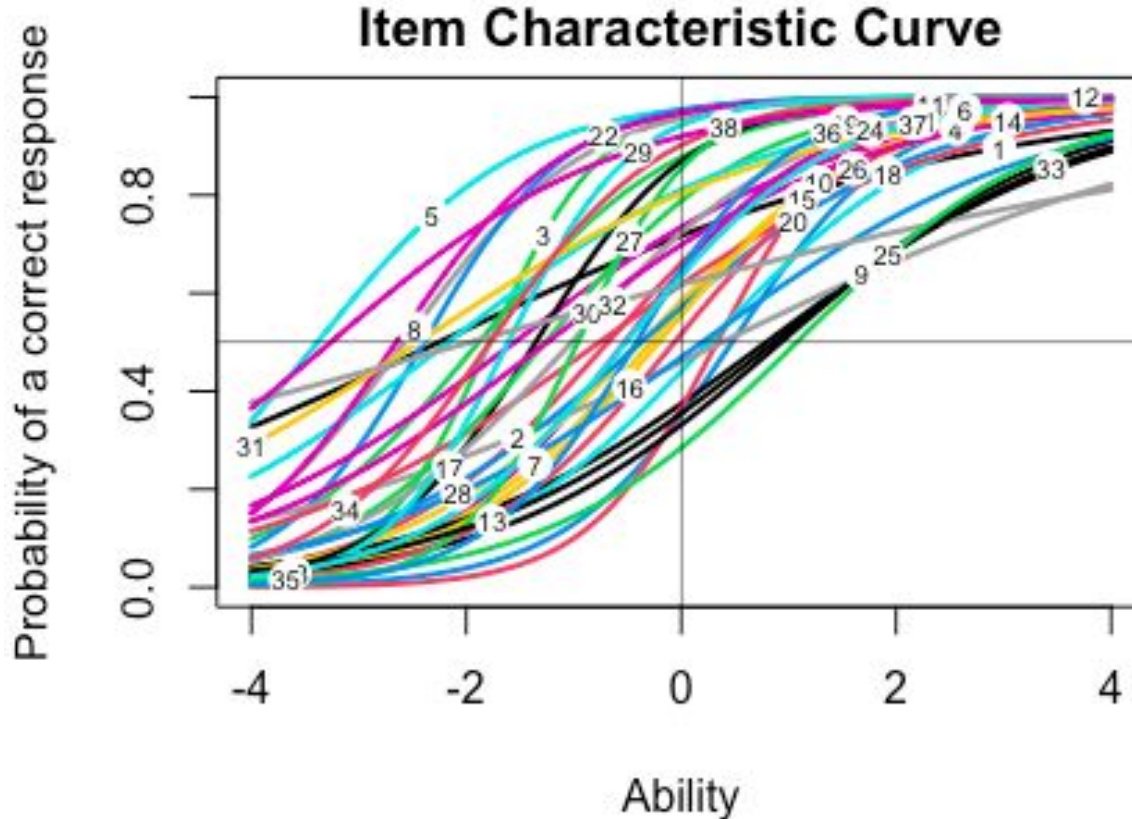
ES150 2018 Term A Grammar

Min: 0.3103
Median: 0.6253
Mean: 0.6539
Max: 0.9604

Discriminatory power - Difficulty plot
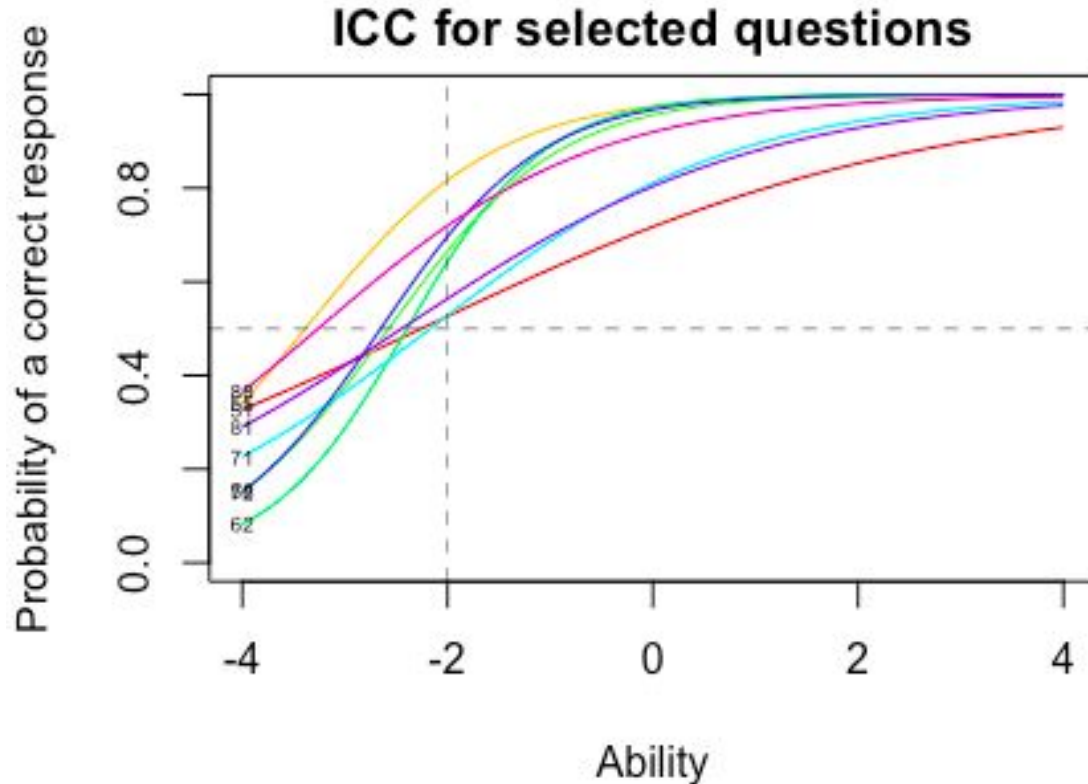

- Nearly equal distribution on discriminatory power

- Difficulty: majority < 0

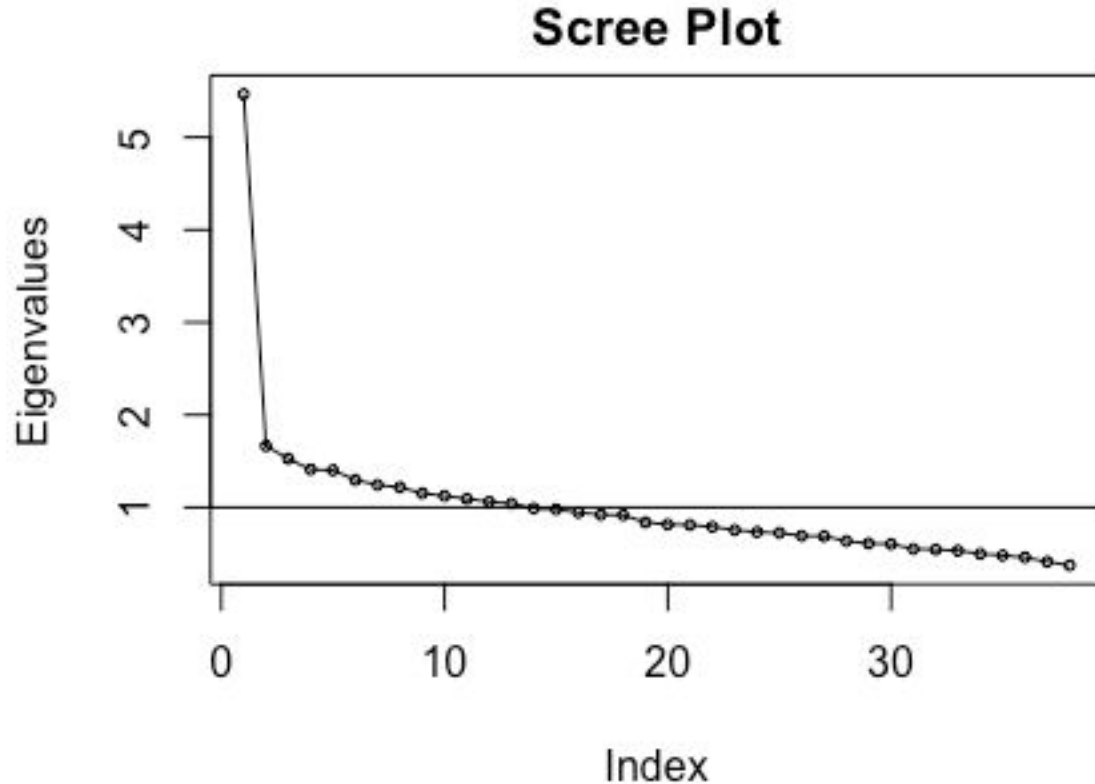# Item Characteristic Curve - Overview

Item Characteristic Curve - Selected Questions

ICC for selected questions

- Question 51, 55, 58, 62, 71, 72, 81, 88

- Select the questions that more than half of the students with ability = -2 got correct

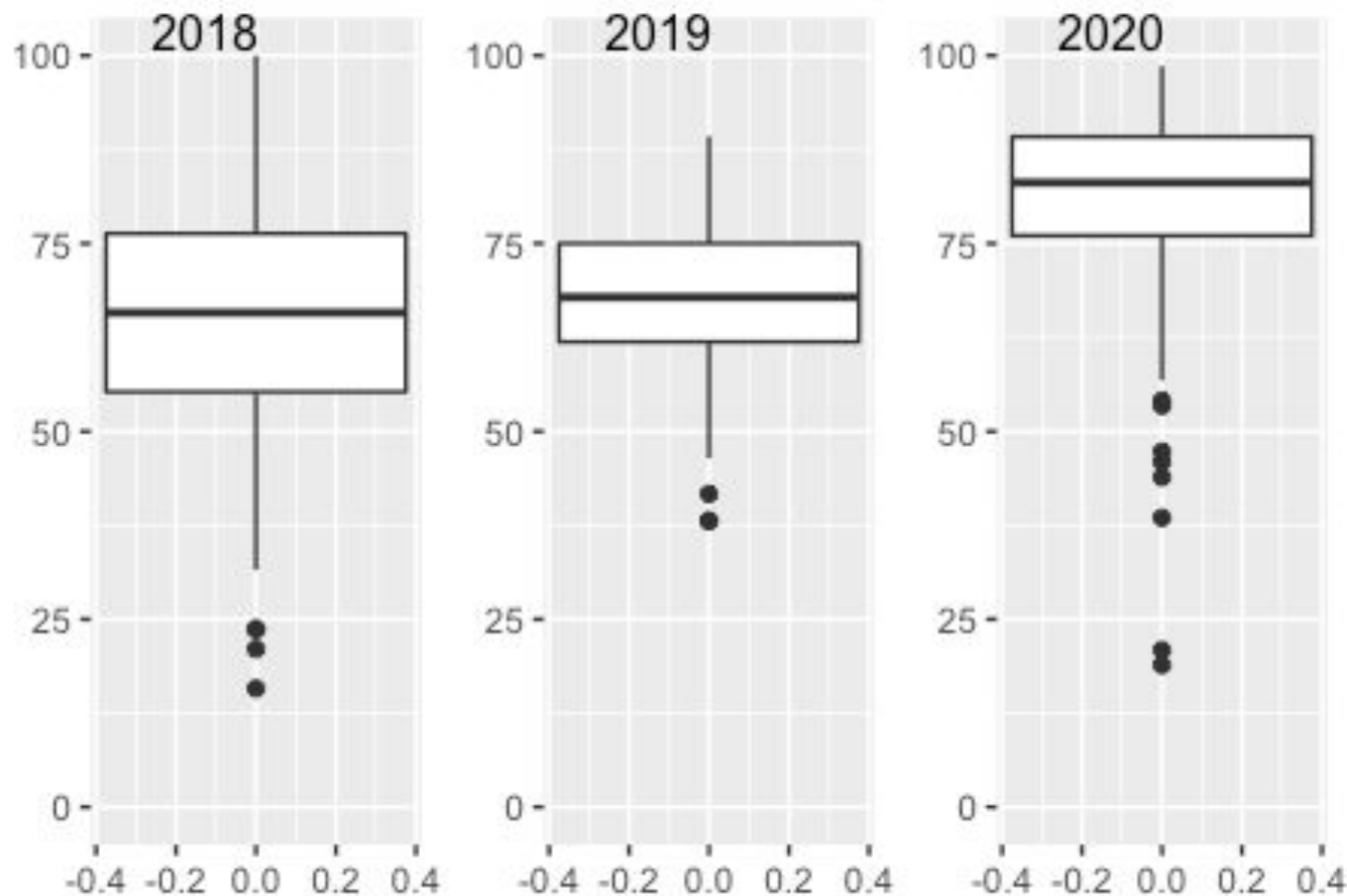- Students with poor ability can still get these questions correct

Scree Plot

Scree Plot

- Since 13 of the items have eigenvalues>1, we only need 13 items to verify unidimensionality
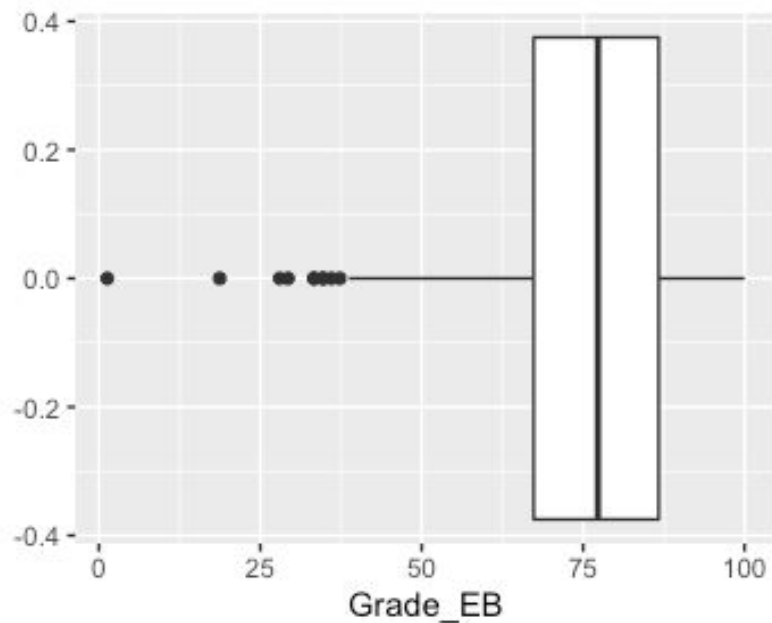
Summary
2018-2020 Term A
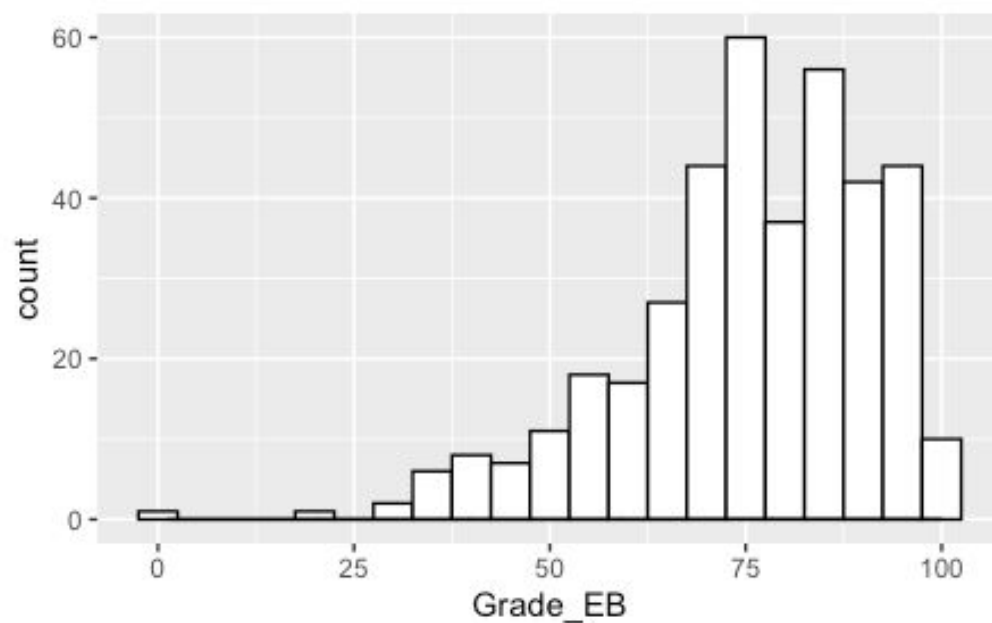
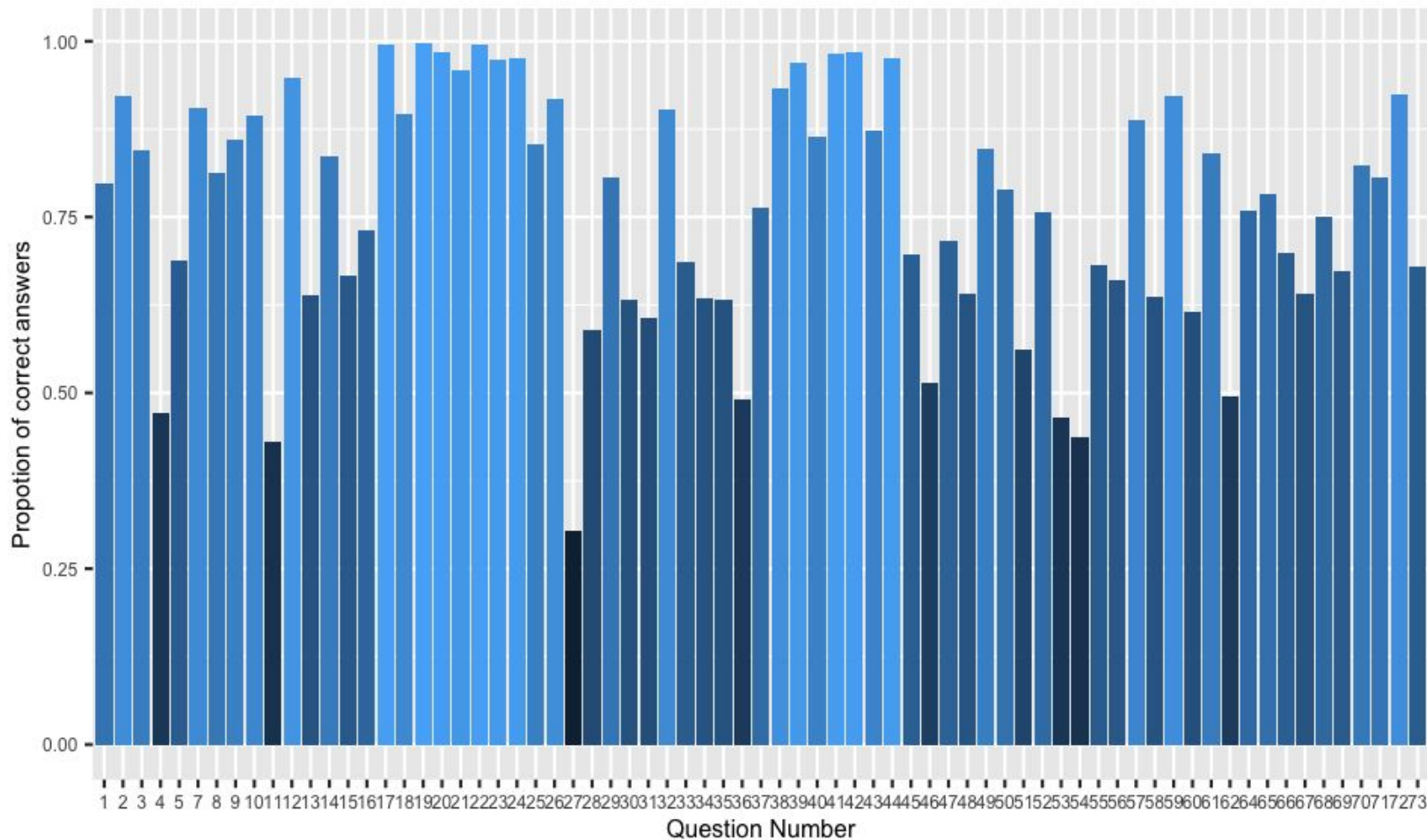# Total score (converted into 0-100 scale)

2020 Term B

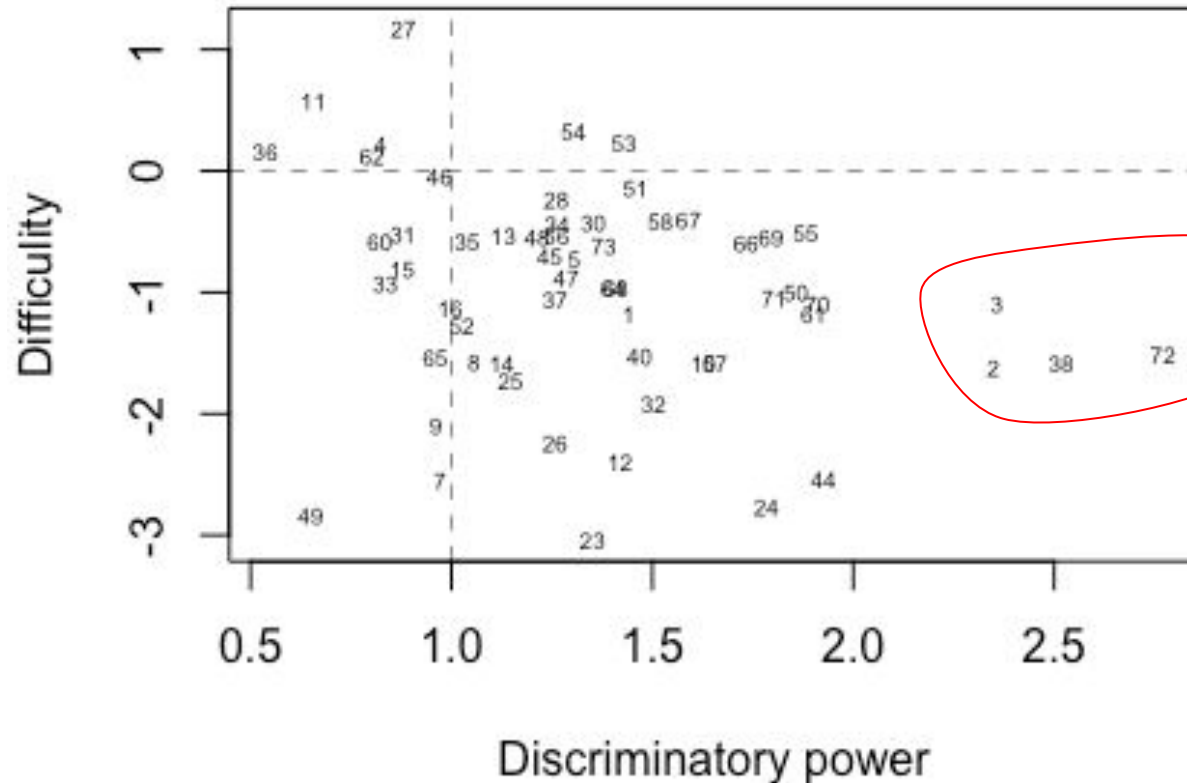# EDA

ES150 2020 Term B Grammar

Min: 0.3041

Median: 0.7833
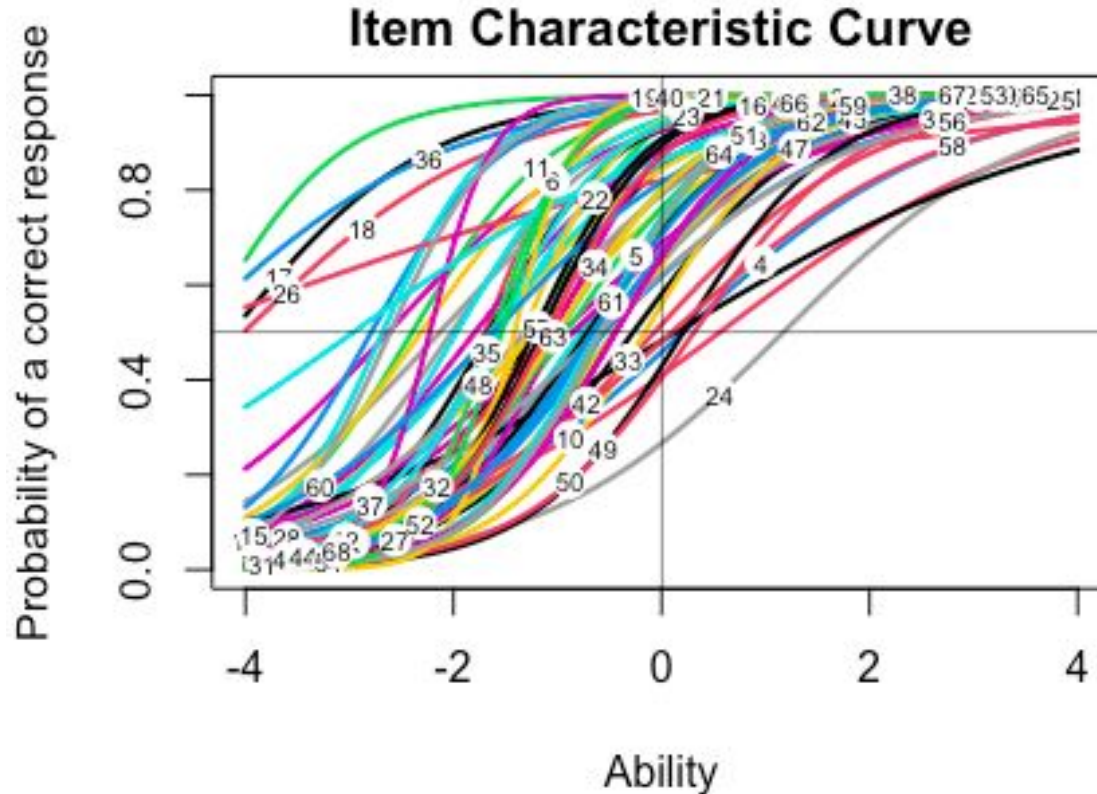
Mean: 0.7618

Max: 0.9974

Discriminatory power - Difficulty plot (outliers removed)
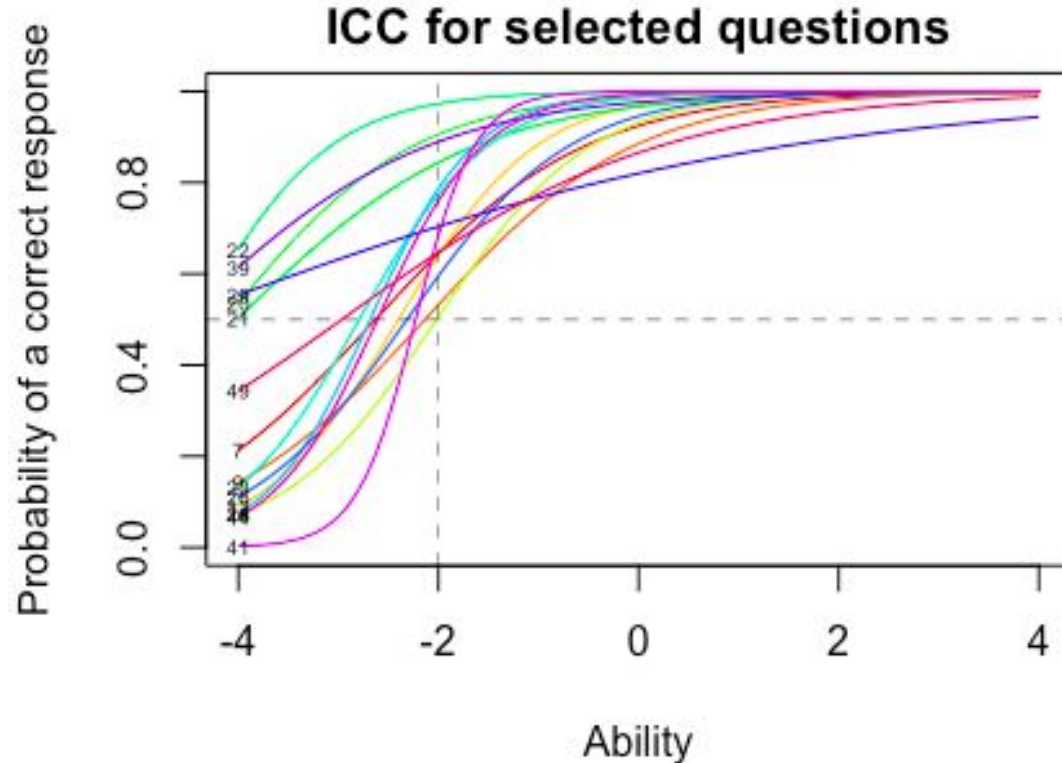

These problems have a strong discriminatory power with a moderate level of difficulty

- Overall lower difficulty and larger discriminatory power

Item Characteristic Curve - Overview

Item Characteristic Curve - Selected Questions 1
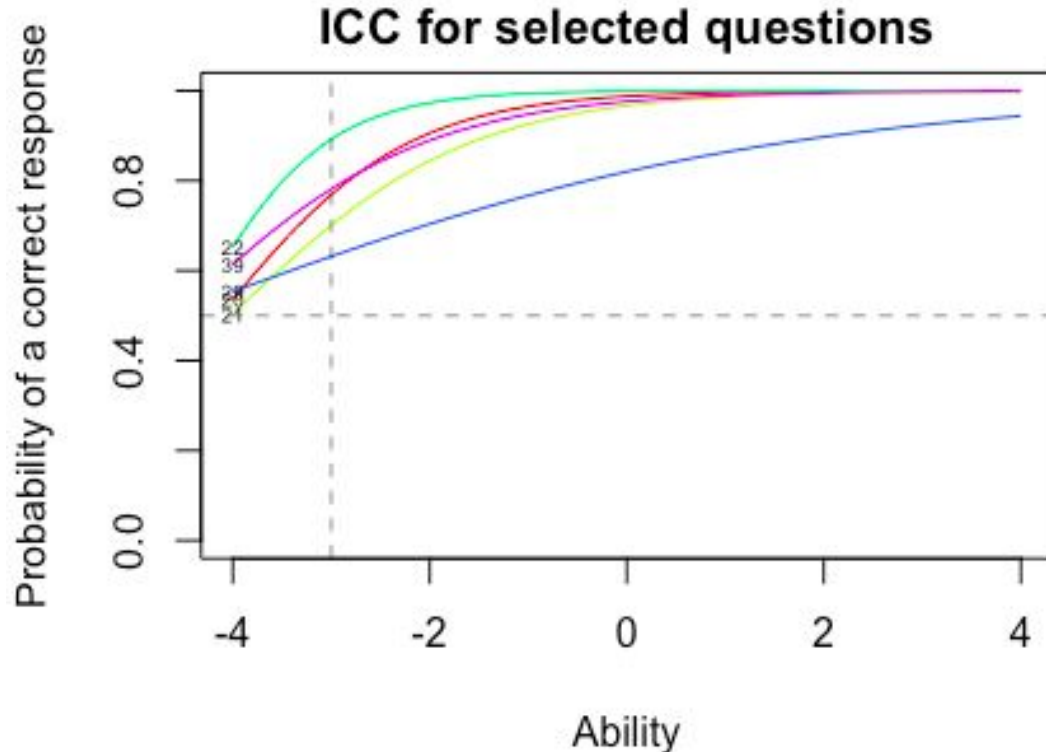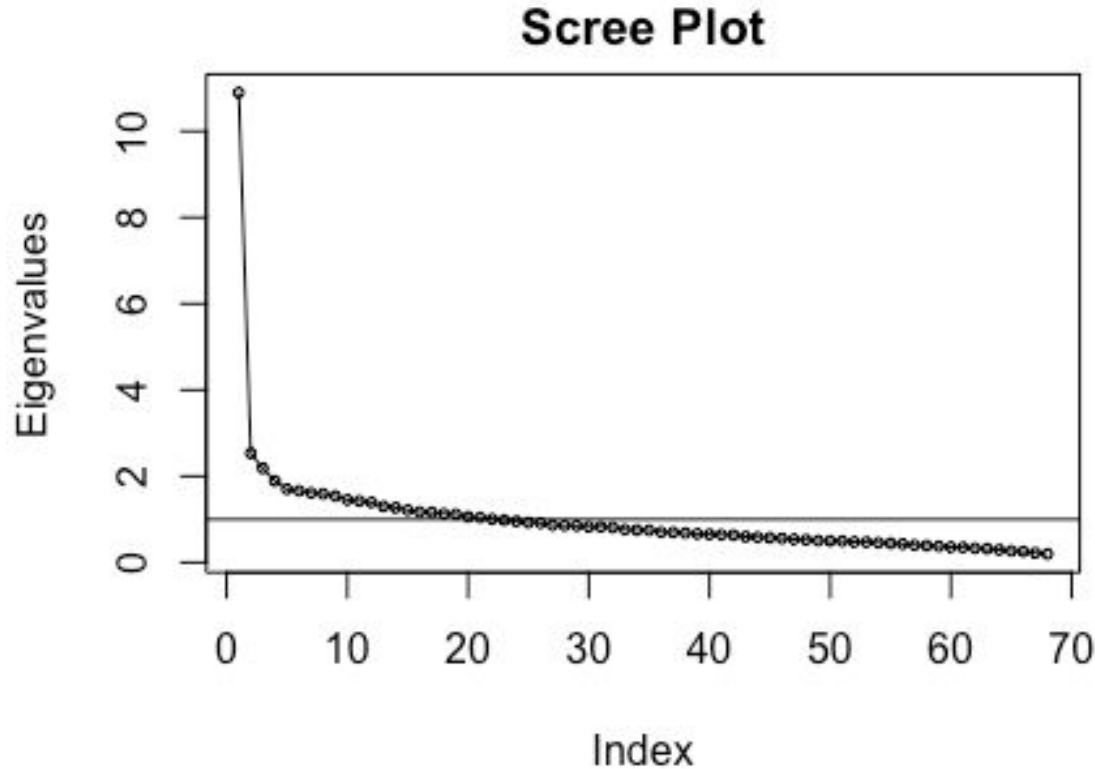

ICC for selected questions

- Question 7, 9, 12, 18, 20, 21, 22, 23, 24, 26, 29, 39, 41, 44, 49

- Select the questions that more than half of the students with ability = -2 got correct

- Students with poor ability can still get these questions correct

Item Characteristic Curve - Selected Questions 2

- Question 20, 21, 22, 29, 39

- Select the questions that more than half of the students with ability = -3 got correct

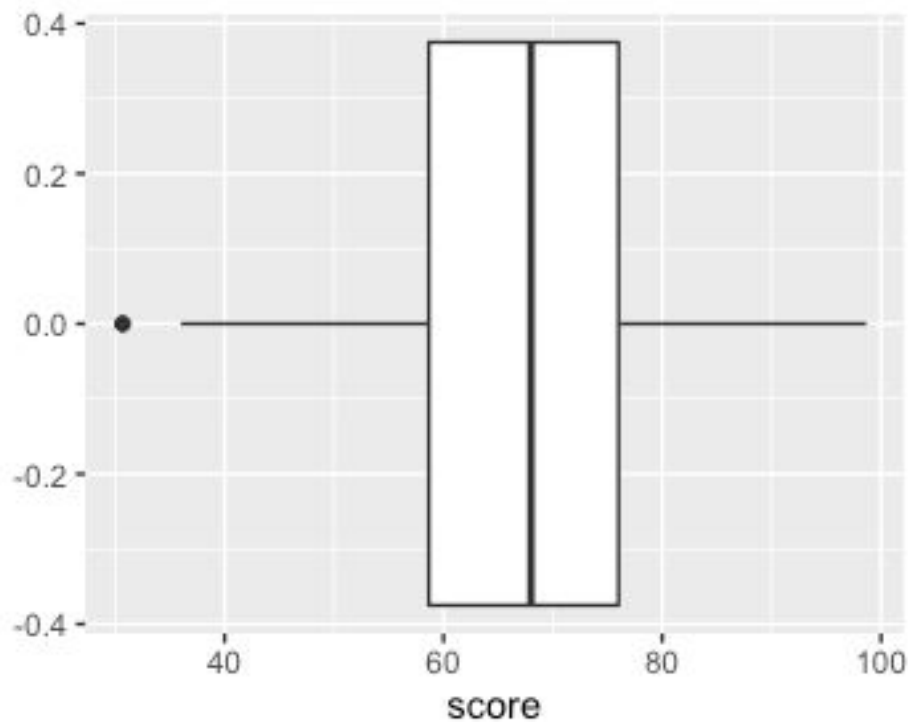- Students with poor ability can still get these questions correct

Scree Plot

Scree Plot

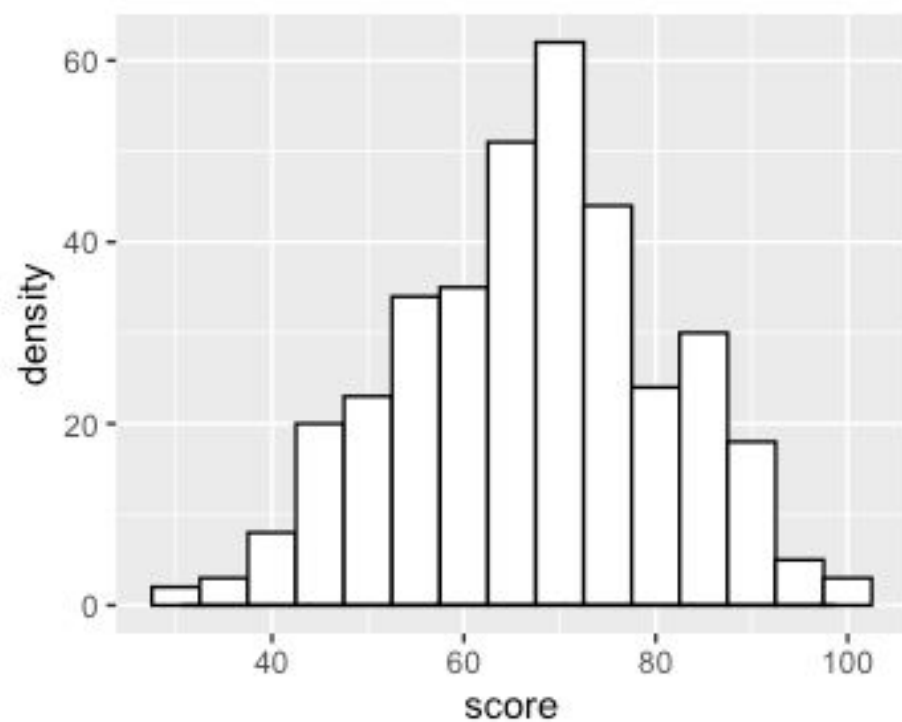- Since 22 of the items have eigenvalues>1, we only need 22 items to verify unidimensionality

2019 Term B

EDA

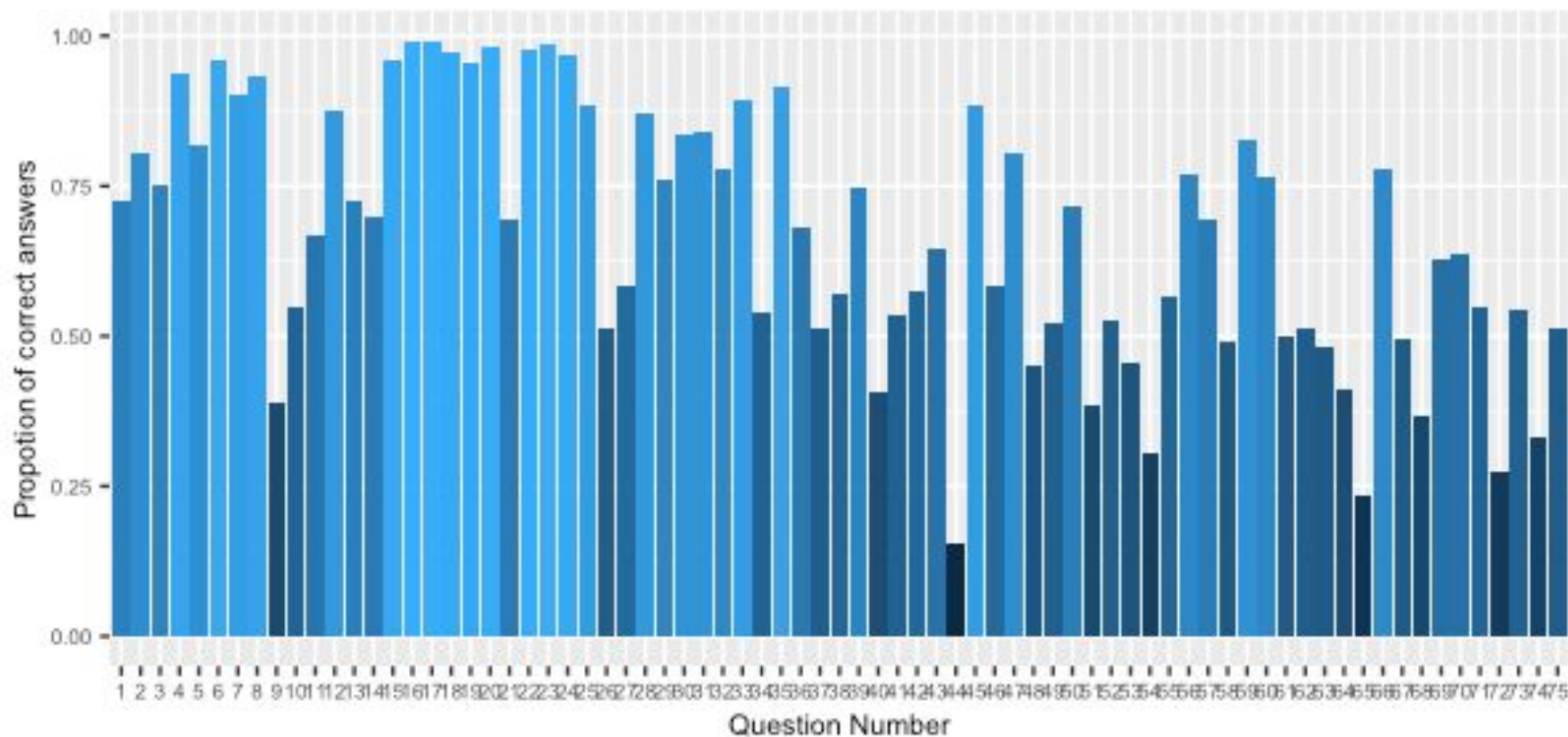# EDA - 正答率

ES150 2019 Term B Grammar

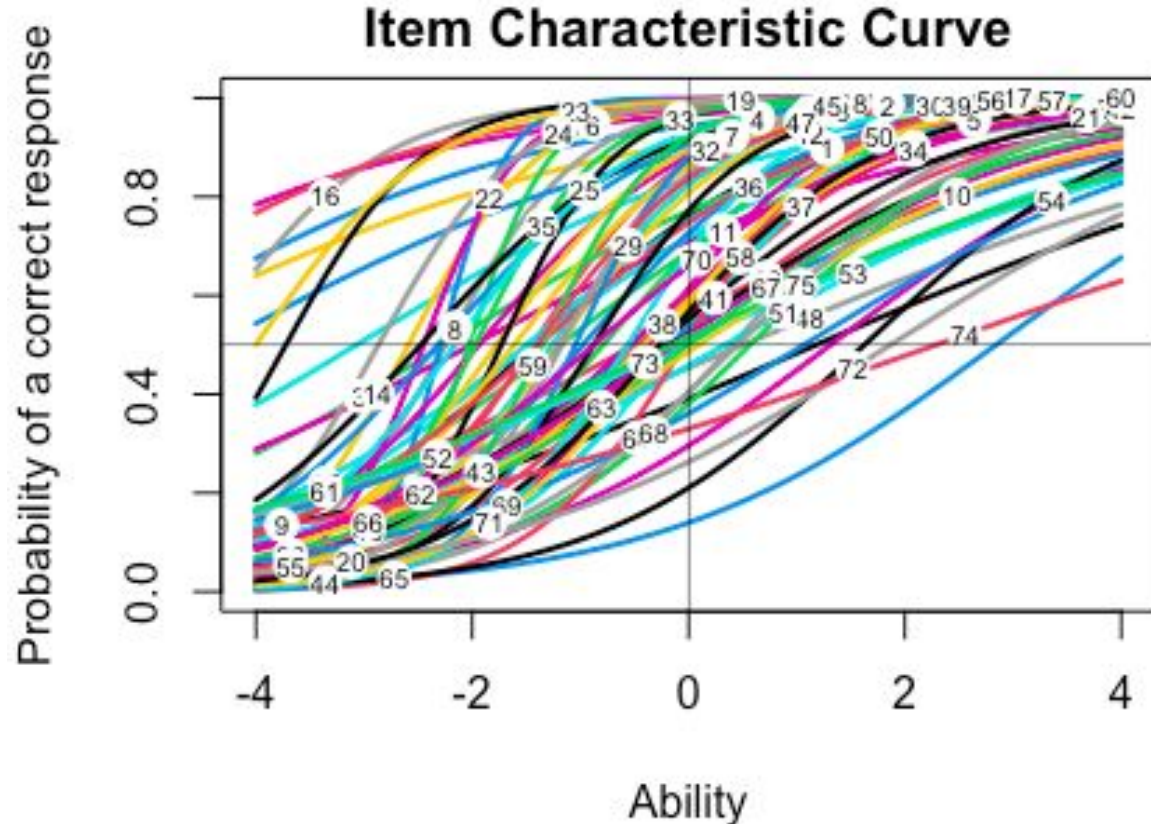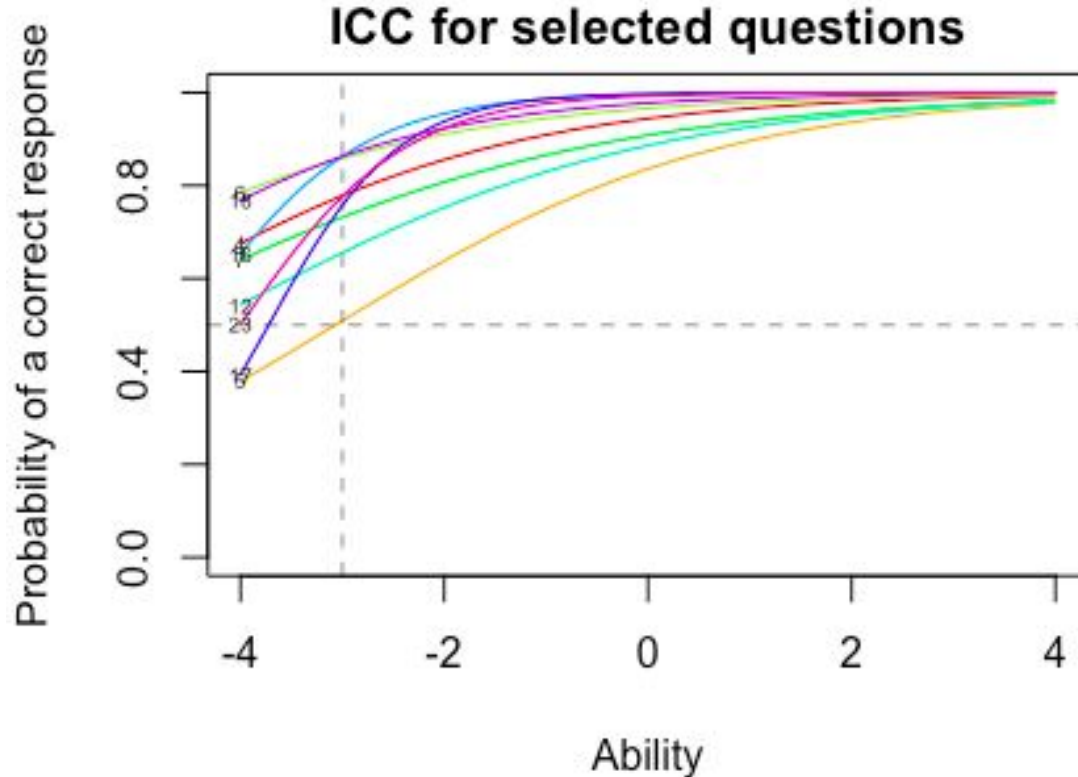# Discriminatory power - Difficulty plot (outliers removed)

These are not well-designed problems since they are too difficult and thus have small discriminatory power

These problems have a strong discriminatory power with a moderate level of difficulty

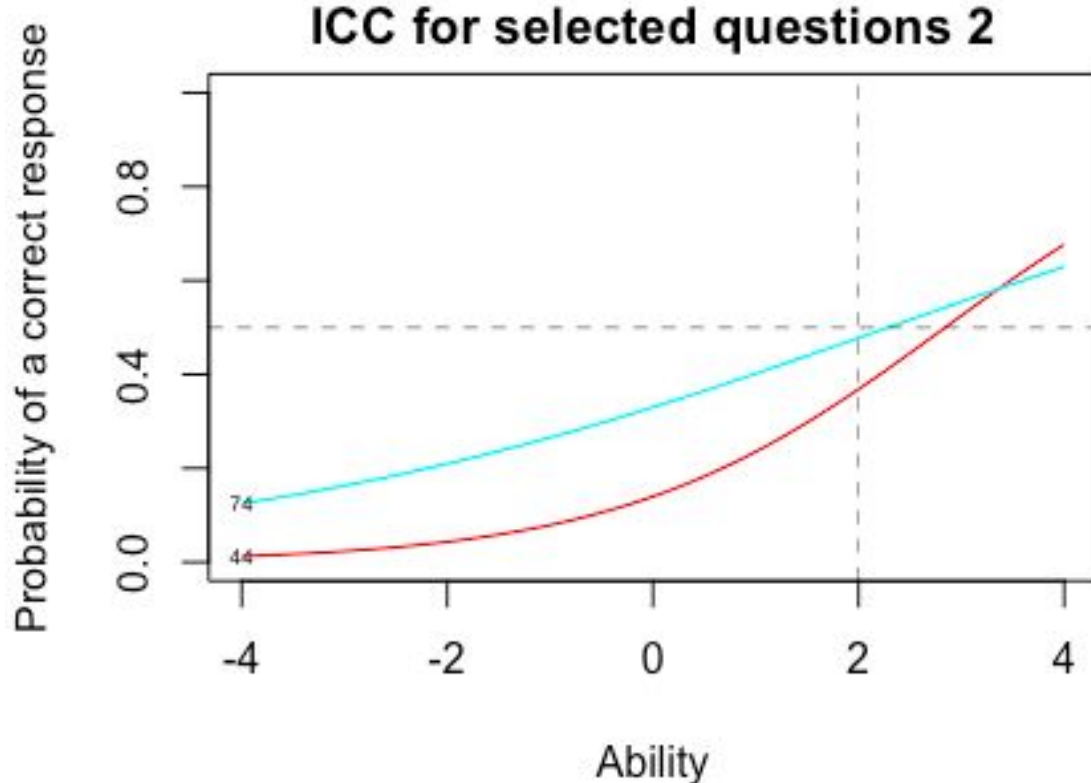# Item Characteristic Curve - Overview
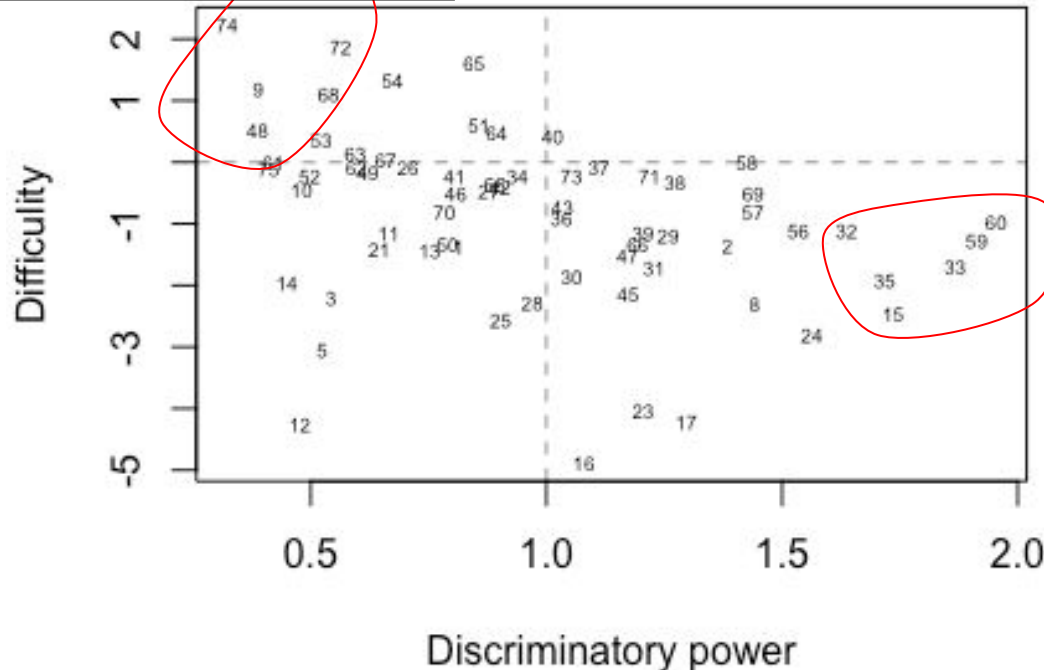
Item Characteristic Curve

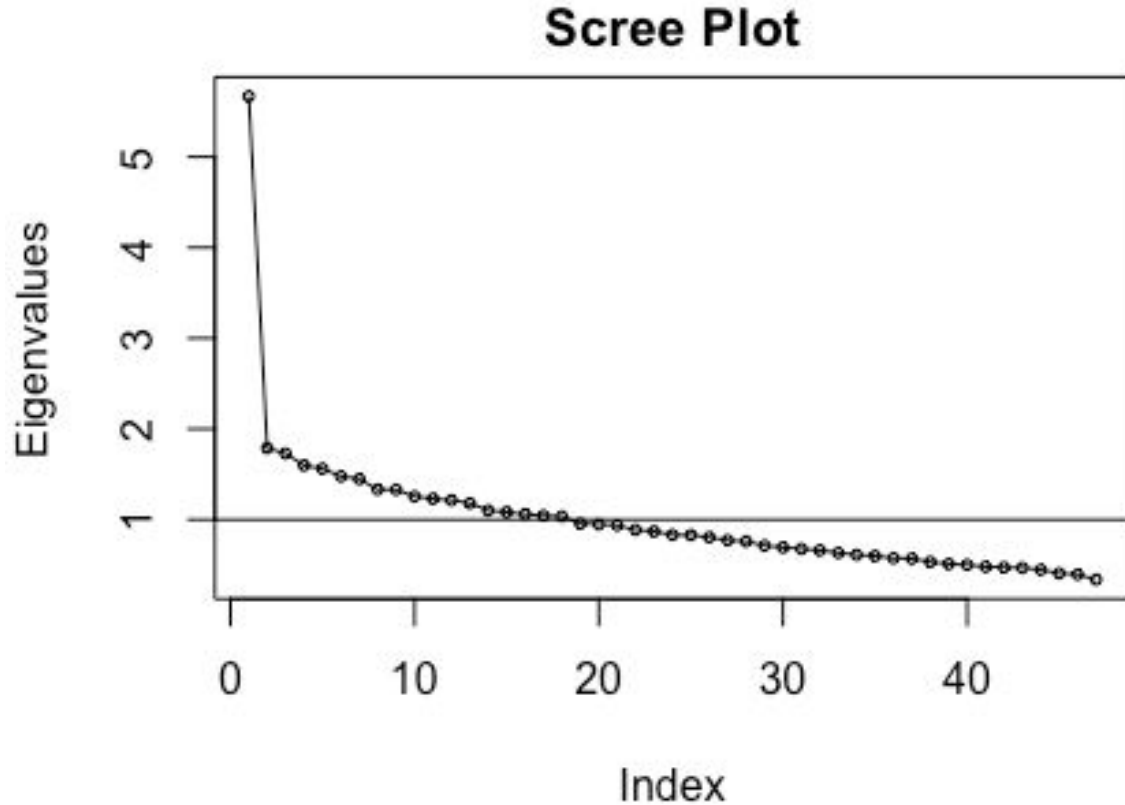# Item Characteristic Curve - Selected Questions 1

- Question 4, 5, 6, 7, 12, 16, 17, 18, 23

- Select the questions that more than half of the students with ability = -3 got correct

- Students with poor ability can still get these questions correct

Item Characteristic Curve - Selected Questions 2

ICC for selected questions 2

- Question 44, 74

- The probability of correct answers of these questions by students with ability = 2 are less than 50%

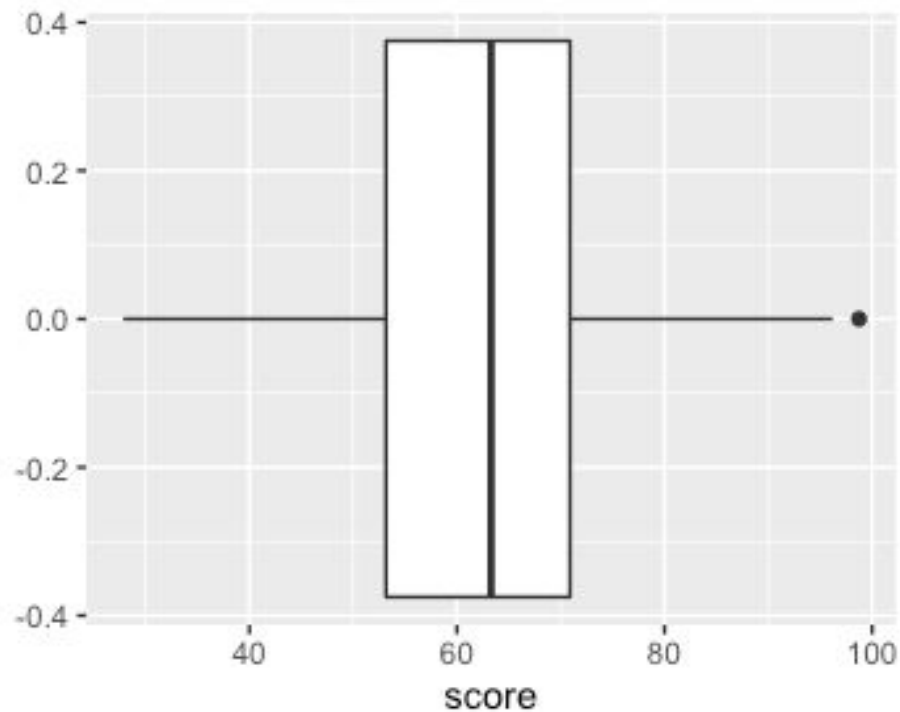- Students with high ability cannot get these questions correct

Scree Plot

Scree Plot

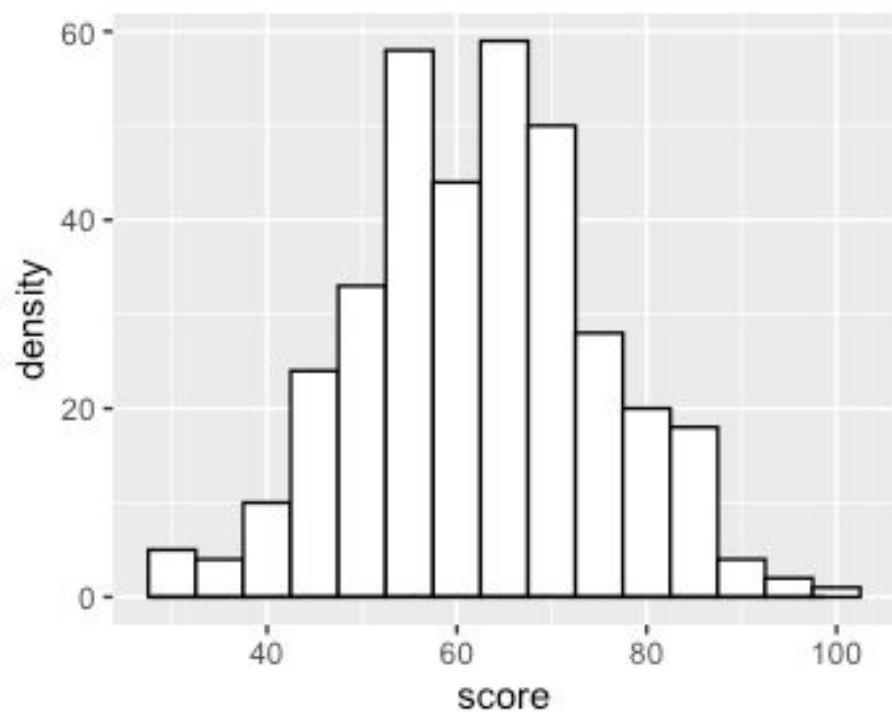- Since 19 of the items have eigenvalues>1, we only need 19 items to verify unidimensionality

2018 Term B

EDA

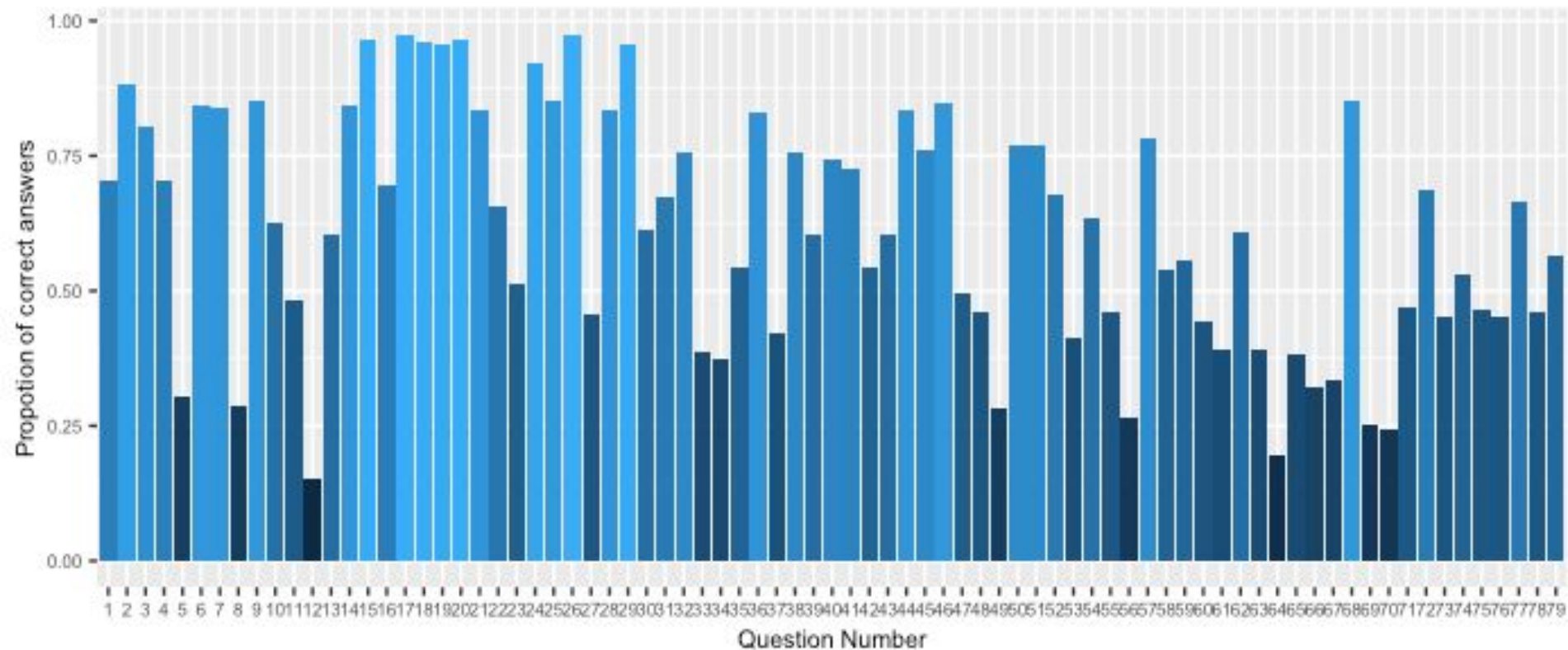# EDA - 正答率

ES150 2018 Term B Grammar

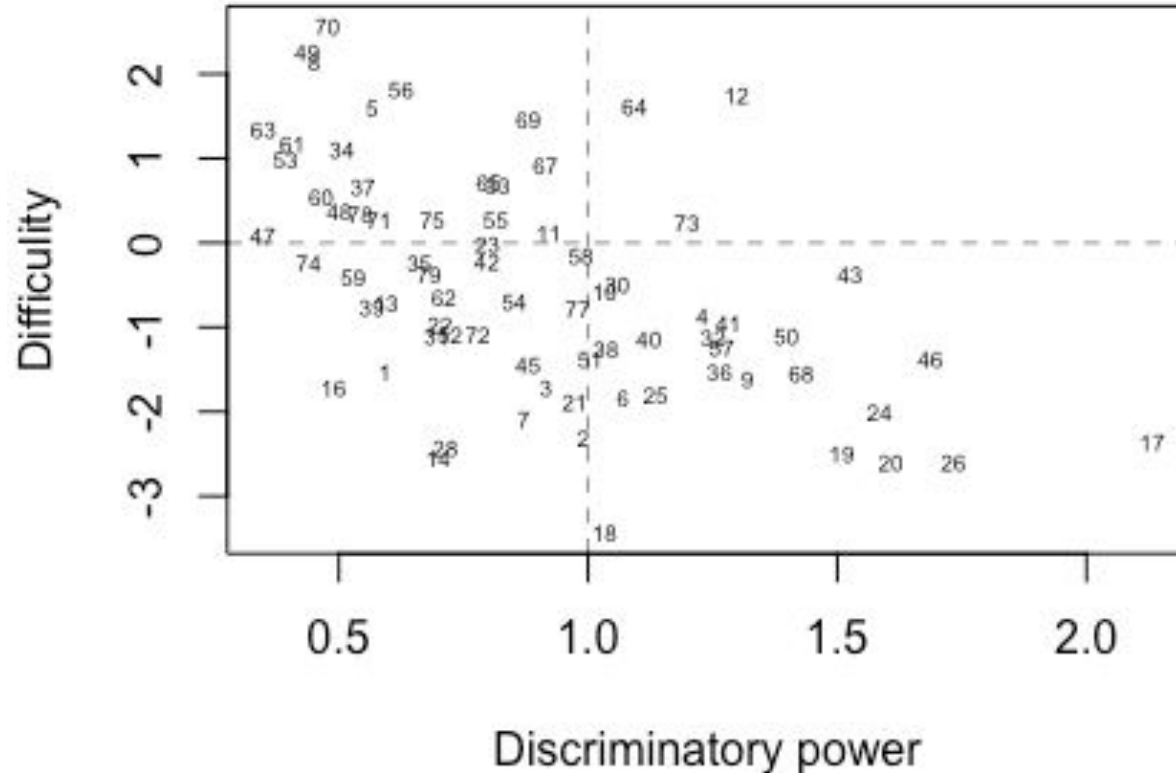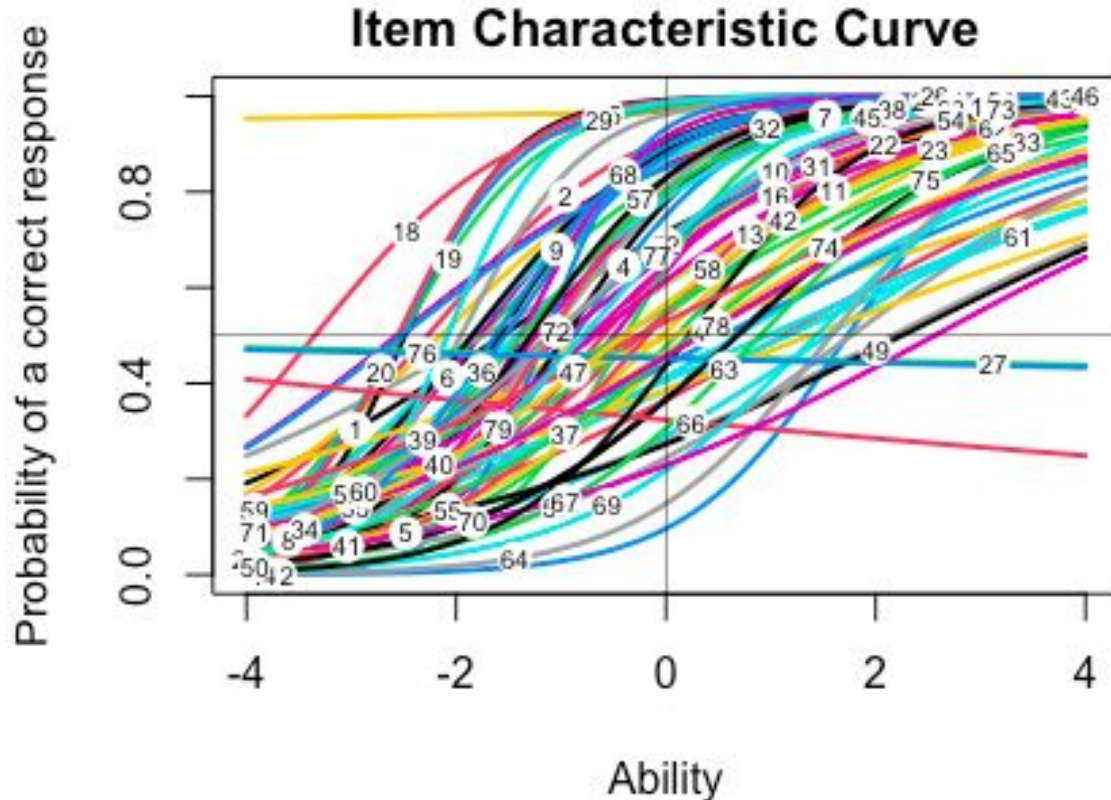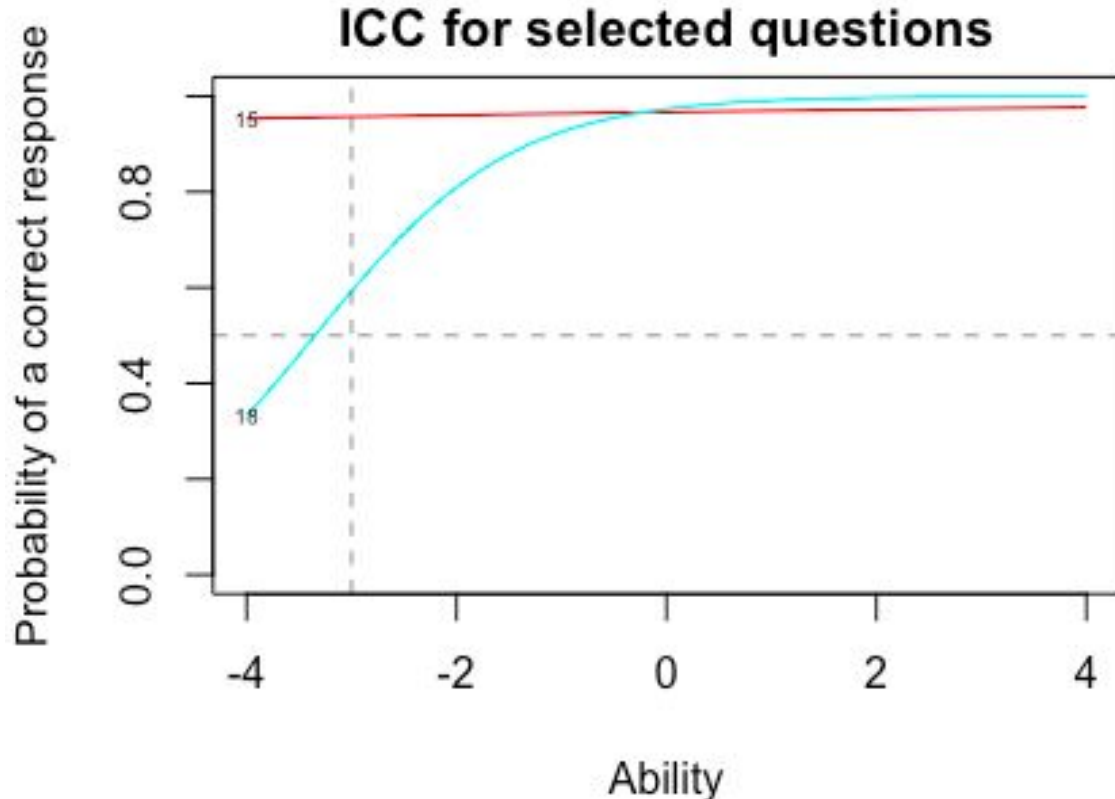# Discriminatory power - Difficulty plot

- Discriminatory power: equal distribution between 0 and 1.5

- Difficulty: clustering around -2 - 1, heavy on <0

Item Characteristic Curve - Overview

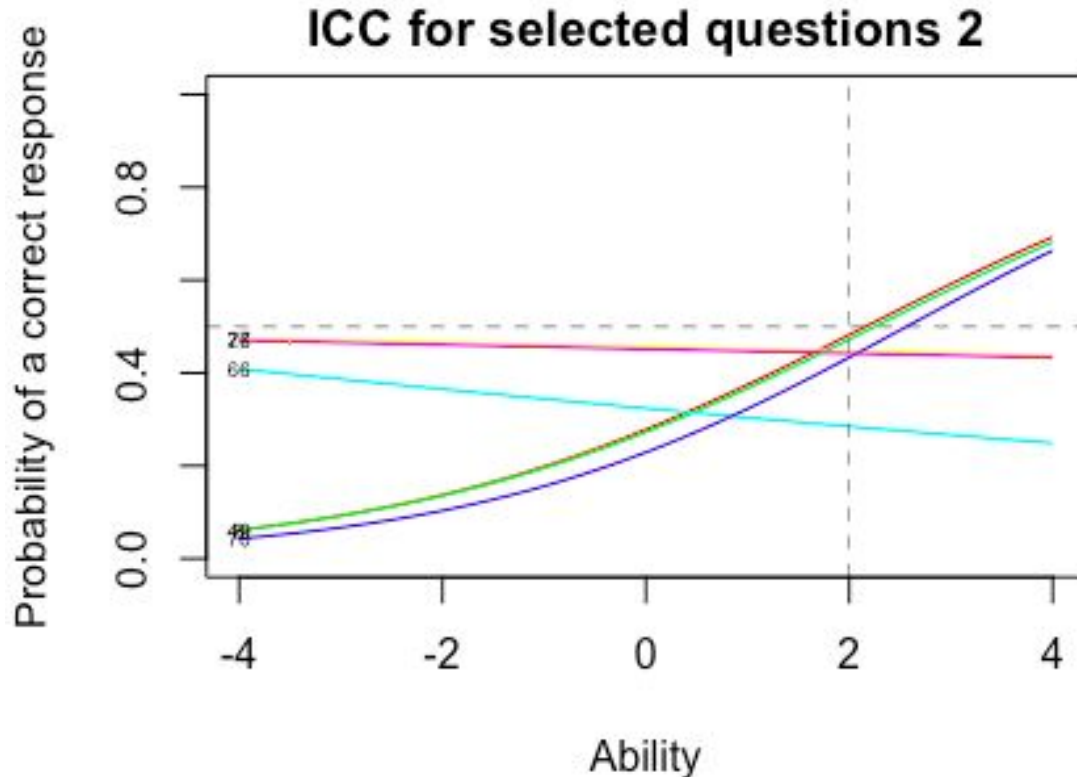# Item Characteristic Curve - Selected Questions


ICC for selected questions

- Question 15, 18

- Select the questions that more than half of the students with ability = -3 got correct

- Students with poor ability can still get these questions correct

Item Characteristic Curve - Selected Questions 2

ICC for selected questions 2

- Question 8, 27, 49, 66, 70, 76

- Select the questions that more than half of the students with ability = 2 got wrong

- Students with high ability cannot get these questions correct

- 27, 66, 76 have negative slopes, meaning students with higher ability are more likely to get wrong

Scree Plot

Scree Plot
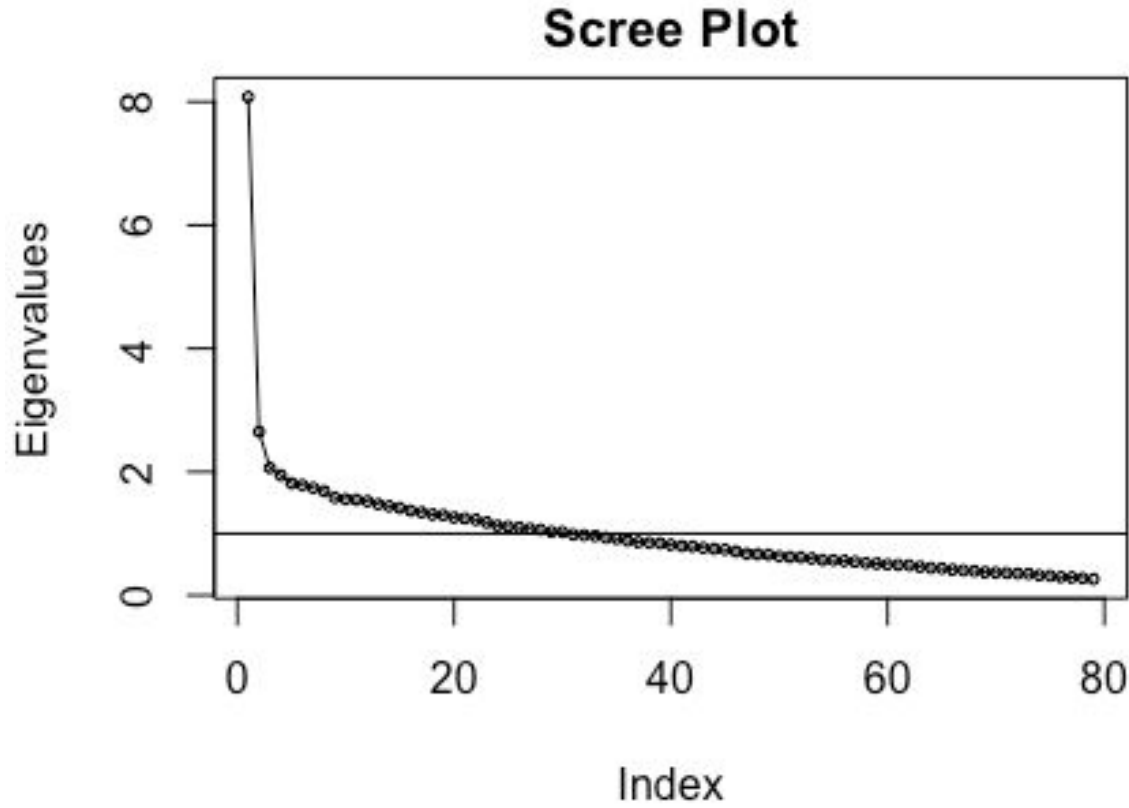
- Since 30 of the items have eigenvalues>1, we only need 30 items to verify unidimensionality

Summary
2018-2020 Term B

Total score (converted into 0-100 scale)